Panasonic Services Company
National Training

TH-42PHD5/TH-50PHD5
TH-42PHW5/TH50PHW5
GPH5D Chassis
Plasma Display Panel

Troubleshooting Guide



⚠Warning

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Objective

The information provided in this document is designed to assist the technician in determining the defective printed circuit board. The troubleshooting flow charts, signal path charts and connector information should provide enough detail that the technician can accurately determine which one of the printed circuit boards is required to repair the product. Alignment and adjustment procedures are also included in this document.

The Block diagrams and the schematic drawings reference the model TH-42PHD5, but the technology is consistent with any GPH5D chassis.

2002 Model Line Up

 **TH-50PHW5** 50-inch (127 cm)	HD Plasma Display HD Panel Digital Cinema Reality Advanced 3-dimensional Progressive Scan 1366 x 768 XGA Resolution (UXGA Compatible)	 **TH-42PHW5** 42-inch (106cm)
 **TH-42PW5** 42-inch (106 cm)	Wide Plasma Display Plasma Contrast Automatic Tracking System (C.A.T.S.) 3-Dimensional Progressive Scan VGA Resolution (UXGA Compatible)	 **TH-37PW5** 37-inch (94cm)

Specifications
Our New 50” & 42” HD Progressive Panels

The industry’s highest-resolution panels

		Panasonic	Company PI	Company F/H
Scanning Method		**Progressive**	**Progressive**	Interlace
	50-inch	**1,366 x 768= 1.05 million pixels**	**1,280 x 768= 0.98 million pixels**	**N/A**
	Pixel pitch	0.810 (H) x 0.810 (V) = 0.656	0.858 (H) x 0.808 (V) = 0.693	
	42/43-inch	**(42” Screen size) 1,024 x 768= 0.79 million pixels**	**(43” Screen size) 1,024 x 768= 0.79 million pixels**	**(42” Screen size) 1,024 x 512= 0.52 million pixels**
	Pixel pitch	0.898 (H) x 0.674 (V) = 0.605	0.930 (H) x 0.698 (V) = 0.649	0.90 (H) x 1.02 (V)= 0.918 / 2= 0.459 [1frame]

Relationship between Picture resolution and Scanning method: 768p > 720p > 680p = 1080i > 1024i

Features

Pixel explanation

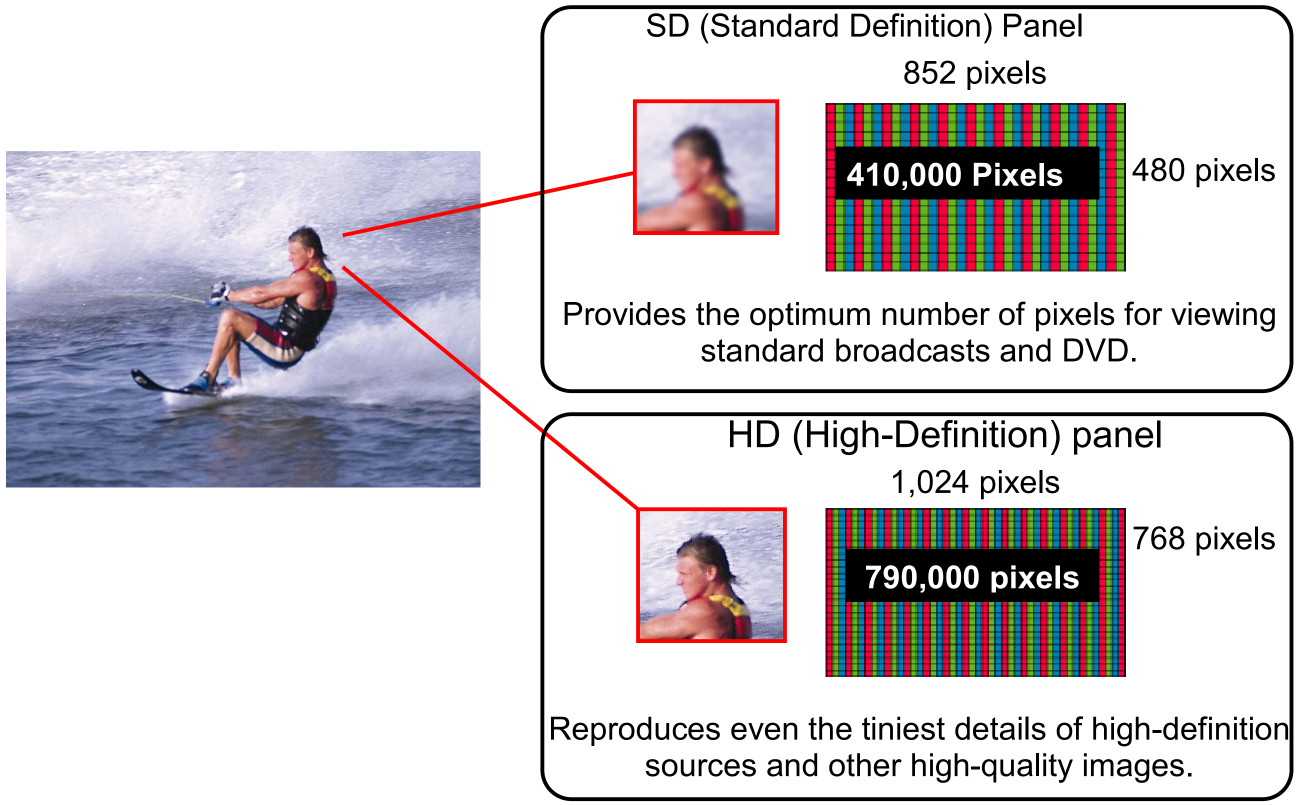


Figure 1

Scan Explanation

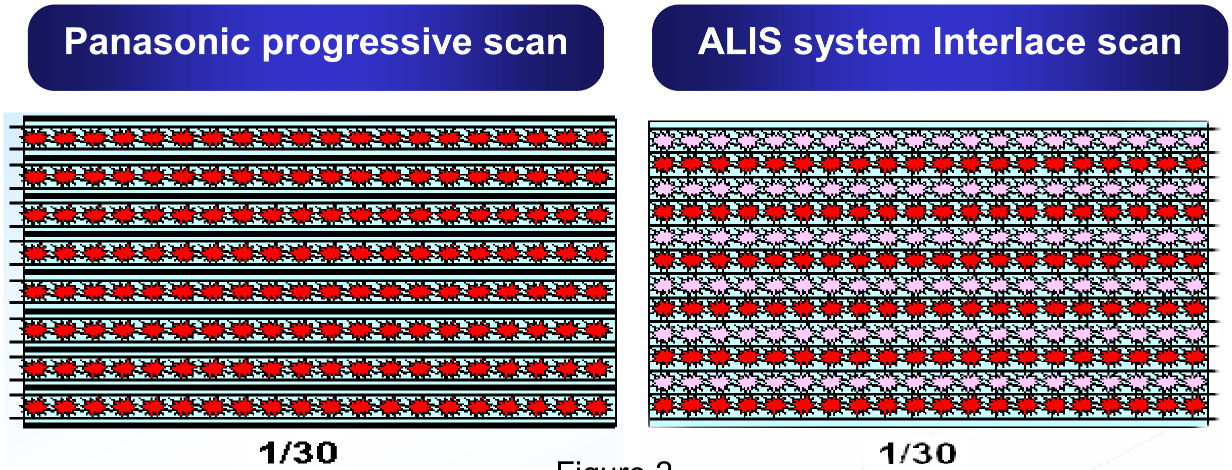


Figure 2

The 1-field (1/60 sec) display pixels on the Panasonic 42" and 37" SD models and on the ALIS system models are VGA level. (Panasonic HD models are XGA level, for higher resolution.)
A.L.I.S. (Alternate Lighting of Surfaces) method is one of the new panel driving systems of plasma display developed by Fujitsu Limited. ALIS method is a system developed from the 3 electrode discharging system.
The ALIS method uses an interlaced driving scheme, which means the even and odd lines are addressed alternately.

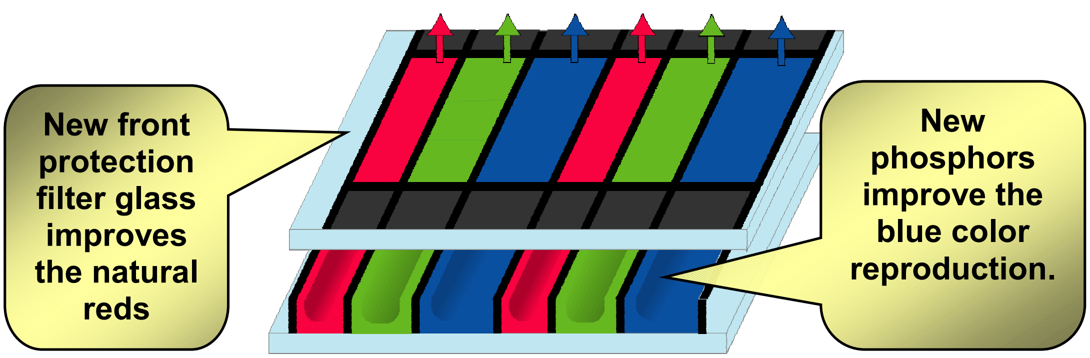


Figure 3

New Asymmetrical Cell Structure Panel
Figure 3 shows the unique asymmetrical cell structure that achieves both high brightness and crisp whites. The asymmetrical arrangement of the red, blue and green cells that control color reproduction results in a dramatically improved light-emitting balance of the three primary colors. This reproduces purer whites while maintaining a high level of brightness.
Model Differences

Single Scan (SD)	Dual Scan (HD)



Figure 4

•Simple and low cost circuit	•High performance •Higher brightness

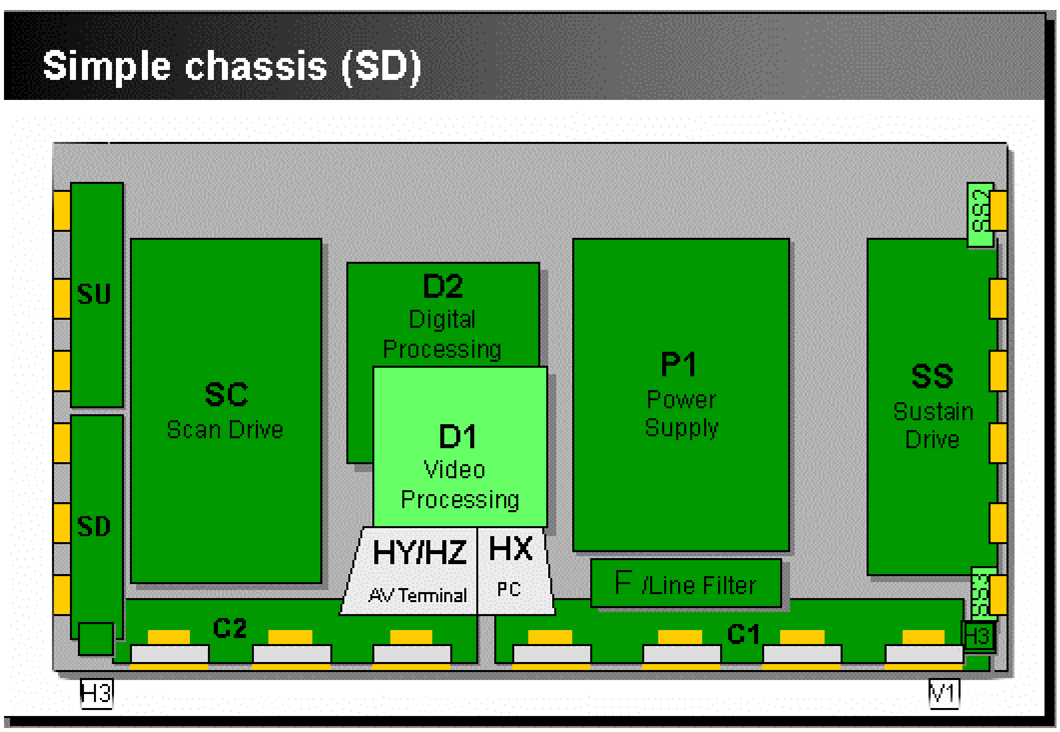


Figure 5

Disassembly

Rear Cover Removal

Remove the 27 screws, shown in Figure 6, and then pull away the rear cover.

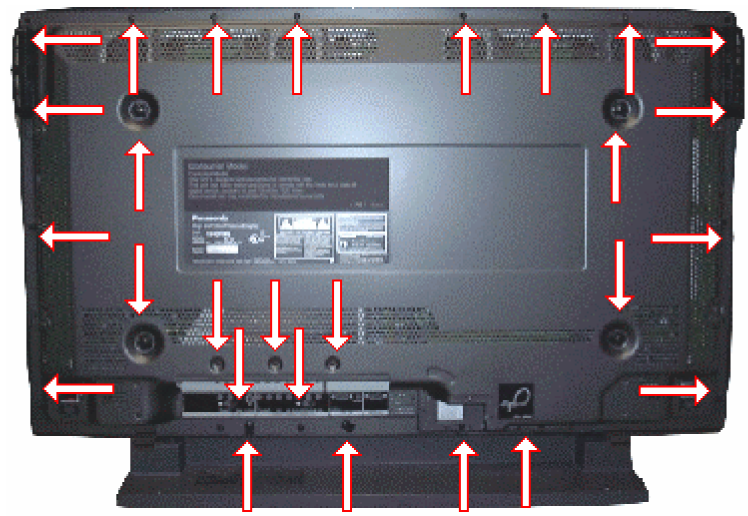


Figure 6

Removal of the shield

Remove the six screws, shown in Figure 7, and then pull away the rear shield cover.

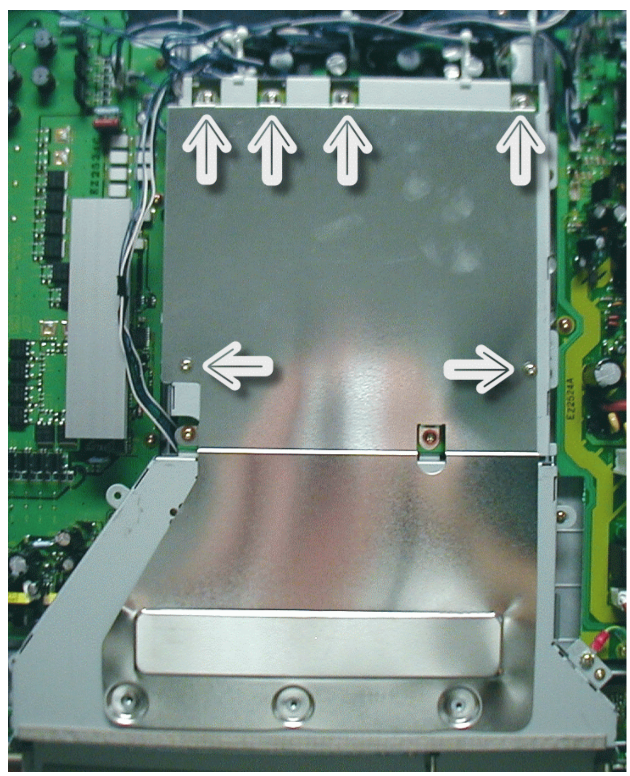
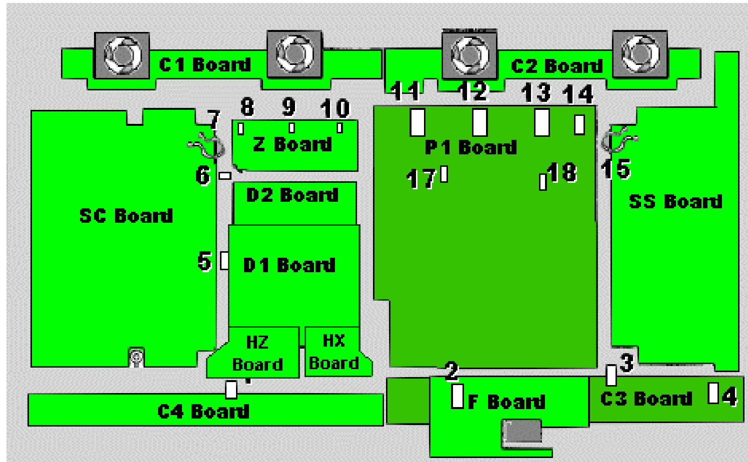


Figure 7

Location of Lead Wiring

High frequency electromagnetic signals can create electrical interference within the unit. Be sure to route all wires through their respective harnesses reference.

The chart below is an illustration representing the connectors and the wire harnesses associated with them.



Clamper Locations
Figure 9

Harness Number

Connector Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Z6 ➔ P6										❶								
Z10 ➔ D10							❶	❶										
Z17➔ D17																	❷	❶
D12 ➔D22																		
D16 ➔ D26																		
D25 ➔ P5							❶	❶	❶	❶								
D27 ➔ P7							❶	❶	❶	❶								
SC2 ➔ P2								❶	❸	❶	❶	❶	❶	❶				
SC4 ➔ P4								❶	❸	❶	❶	❶	❶	❶				
SC20 ➔ D20																❶		
SC21➔ D21																❶		
H37➔ Z3	❶				❶	❶	❶	❶								❶		
H37 ➔Z4	❶	❶	❶	❶	❶	❶	❶	❶	❶							❶		
SS1 ➔P1															❷			
SS3 ➔P3															❶			
SS32 ➔C32																		
SS42 ➔C42				❶														
ESC POWER➔ SS34				❶														
ESC V-BOARD➔ C44				❶														
F9 ➔ P9																		
Fan 1 ➔ P10								❶	❸	❶								
Fan 2 ➔ P11								❷	❷	❶								
Fan 3 ➔ P12											❶	❶	❷	❷				
Fan 4 ➔ P13											❶	❶	❶	❷				

❶ = Wind the cable through the clamper once
❷ = Wind the cable through the clamper two times
❸ = Wind the cable through the clamper three times

42" HD PCB Board Layout Diagram

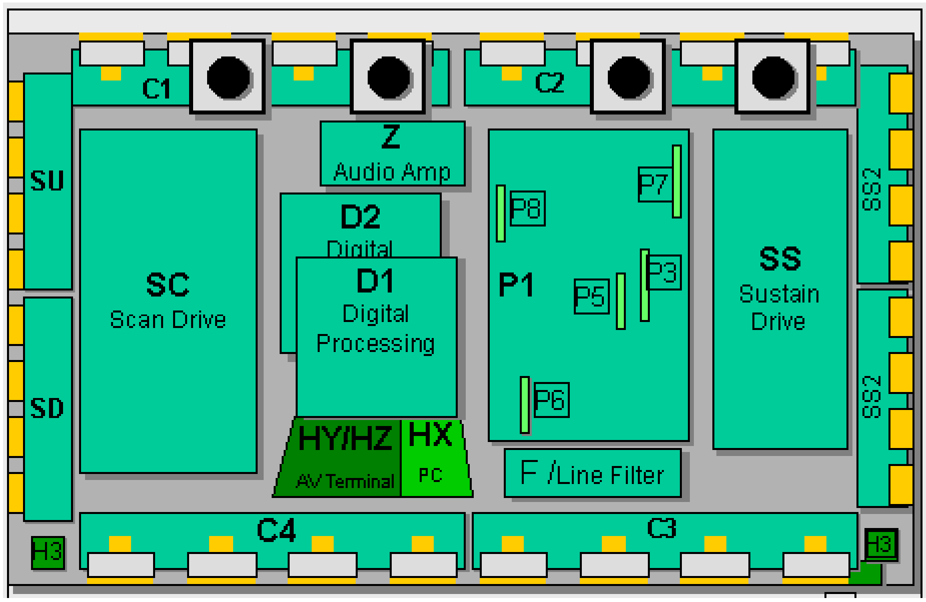


Figure 10

Printed Circuit Board Information Table

Board Name	Part Number	Function
C1	TNPA2428	Data Drive (Upper Left)
C2	TNPA2429	Data Drive (Upper Right)
C3	TNPA2430	Data Drive (Lower Right)
C4	TNPA2431	Data Drive (Lower Left)
D1	TZTNP01LLSB	Format Converter
D2	TNPA2427	Plasma AI Sub-Field Processor
F	TNPA2444	Line filter
H3	TNPA2249	Speaker terminal
HX	TZTNP01LLSU	PC type Input terminal
HZ	TXNHZ40JJS	RCA type Input terminal
P	TXN/P10LLS	Power supply
P3	TNPA2439	Drive voltage oscillator
P5	TNPA2440	Primary oscillator
P6	TNPA2441	PFC oscillator
P7	TNPA2442	Drive voltage protection
P8	TNPA2443	Process voltage protection
S1	TNPA2283AC	Power switch
SC	TNPA2434	Scan out
SD	TNPA2433	Scan connection (Lower)
SS	TNPA2435	Sustain out
SS2	TNPA2436	Sustain connection (Upper)
SS3	TNPA2437	Sustain connection (Lower)
SU	TNPA2432	Scan connection (Upper)
V1	TNPA2282AC	Front SW. & Remote receiver
Z	TNPA2445	Audio out

50” PCB Board Layout Diagram

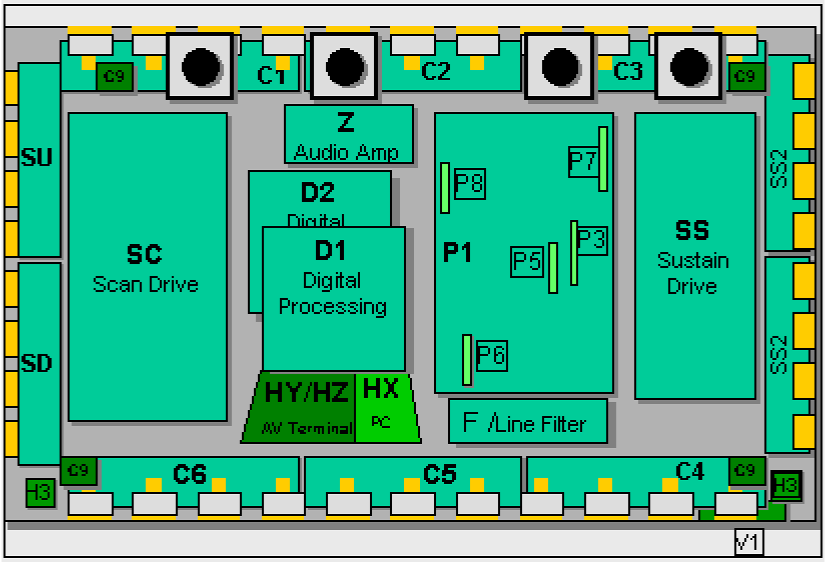


Figure 11

Board Name	Part Number	Function
C1	TNPA2510	Data Drive (Upper Left)
C2	TNPA2511	Data Drive (Upper Center)
C3	TNPA2512	Data Drive (Upper Right)
C4	TNPA2513	Data Drive (Lower Right)
C5	TNPA2514AB	Data Drive (Lower Center)
C6	TNPA2515	Data Drive (Lower Left)
C9	TNPA2608	Energy Recovery Circuit
D1	TZTNP01MHSB	Format Converter
D2	TNPA2427AB	Plasma AI Sub-Field Processor
F	TXN/F10MHS	Line filter
H3	TNPA2249	Speaker Terminal
HX	TZTNP02KESE	PC type Input terminal
HZ	TXNHZ40JJS	RCA type Input terminal
P1	TXNP110MHS	Power supply
P3	TNPA2566	Drive voltage oscillator
P5	TNPA2567	Primary oscillator
P6	TNPA2568	PFC oscillator
P7	TNPA2569	Drive voltage protection
P8	TNPA2570	Process voltage protection
S1	TNPA2283AC	Power switch
SC	TNPA2434AB	Scan out
SD	TNPA2518	Scan connection (Lower)
SS	TXNSS10MHS	Sustain out
SS2	TNPA2519	Sustain connection (Upper)
SS3	TNPA2520	Sustain connection (Lower)
SU	TNPA2517	Scan connection (Upper)
V1	TNPA2282AC	Front SW. & Remote receiver
Z	TNPA2445	Audio out

42" SD PCB Layout Diagram

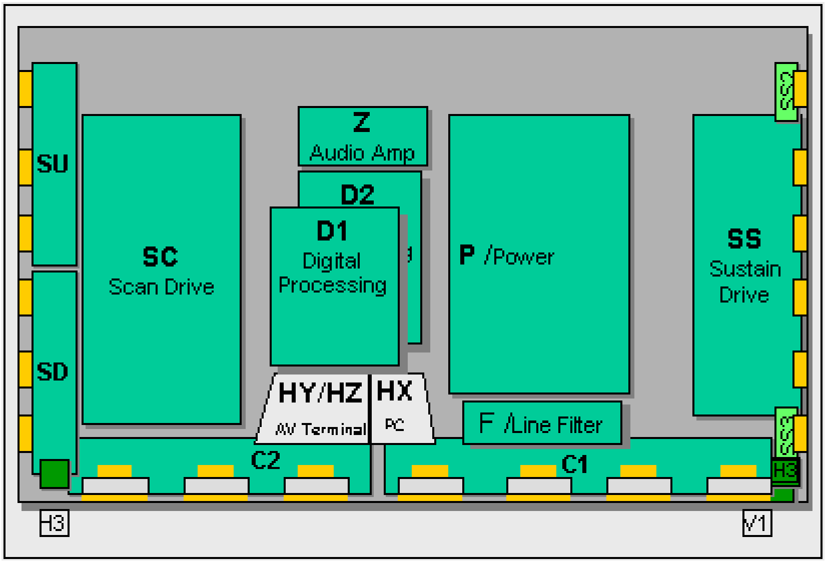


Figure 12

Board Name	Part Number	Function
C1	TNPA2540	Data Drive (Lower Right)
C2	TNPA2541	Data Drive (Lower Left)
D1	TZTNP01MMSB	Format Converter
D2	TNPA2589	Plasma AI Sub-Field Processor
F	TXN/F10MMS	Line filter
H3	TNPA2249	Speaker terminal
HX	TZTNP020JAS	PC type Input terminal
HZ	TXNHZ40JJS	RCA type Input terminal
P	TNPA2598	Power supply
S1	TNPA2622	Power switch
SC	TNPA2534	Scan out
SD	TNPA2584	Scan Connection (Lower)
SS	TNPA2535	Sustain Out
SS2	TNPA2536	Sustain Connection (Upper)
SS3	TNPA2537	Sustain Connection (Lower)
SU	TNPA2583	Scan Connection (Upper)
V1	TNPA2621	Front SW. & Remote Receiver
Z	TNPA2590	Audio out

Video Signal Path Explanation

HY/HZ Board

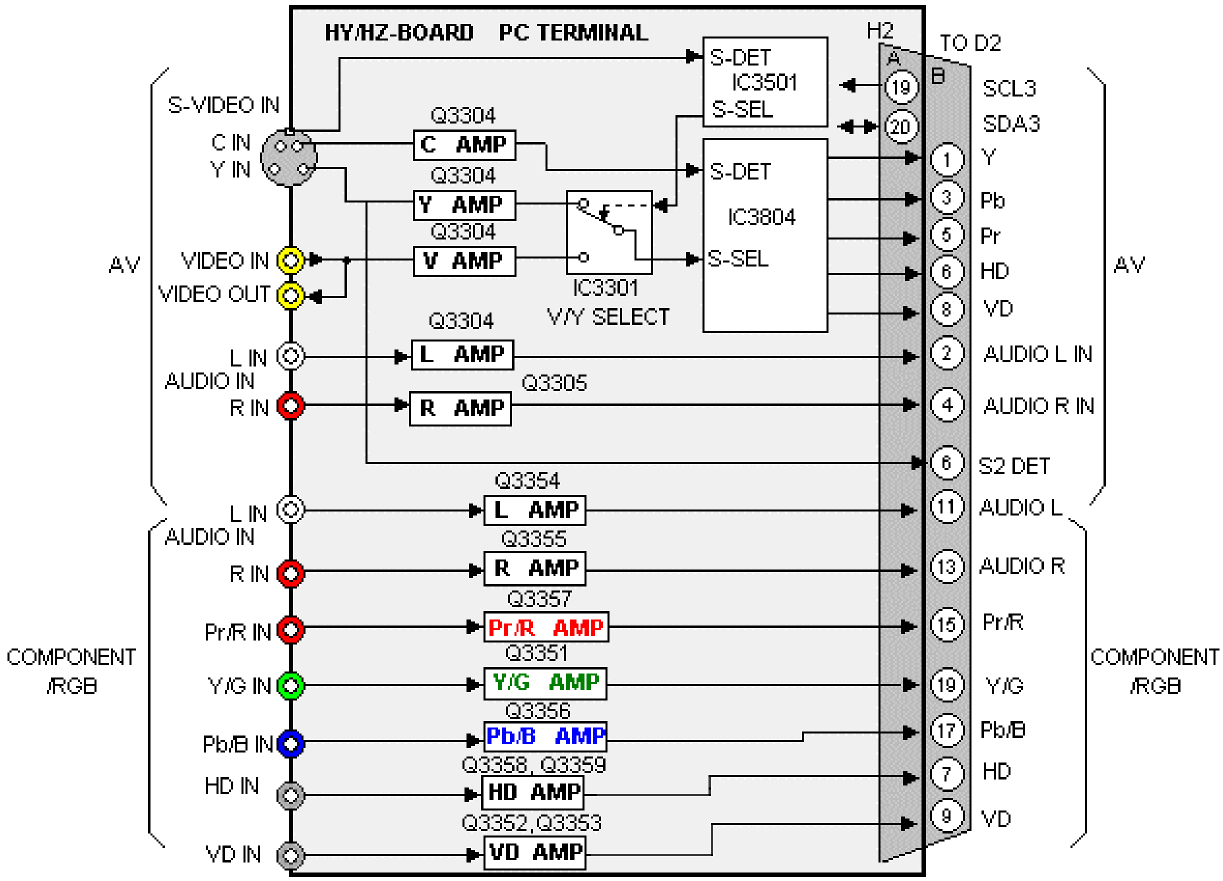


Figure 13

The "HY/ HZ" board is equipped with one Component input, one Composite input and one S-Video input. The Composite and S-Video inputs are applied to a switching circuit, which is controlled by the system control IC, located on the D1-Board. The switch select command is sent via the SCL3 and SDA3 lines. After signal selection the composite or S-Video signals are amplified, buffered, and applied to a 3D comb filter inside IC3803. The 3D Comb filter converts the Composite input signals to Y, Pb, and Pr component signals. The output of IC3804 is applied to the D1 Board via pins 1, 3, and 5 of the connector H2/D2.

Individual amplifiers buffered the Component input signals that are then applied to the D1-Board via pins 15, 17, and 19 of the connector H2/D2. Vertical and Horizontal Sync signals are also amplified on this board before they are applied to the D1 Board.

HX Board

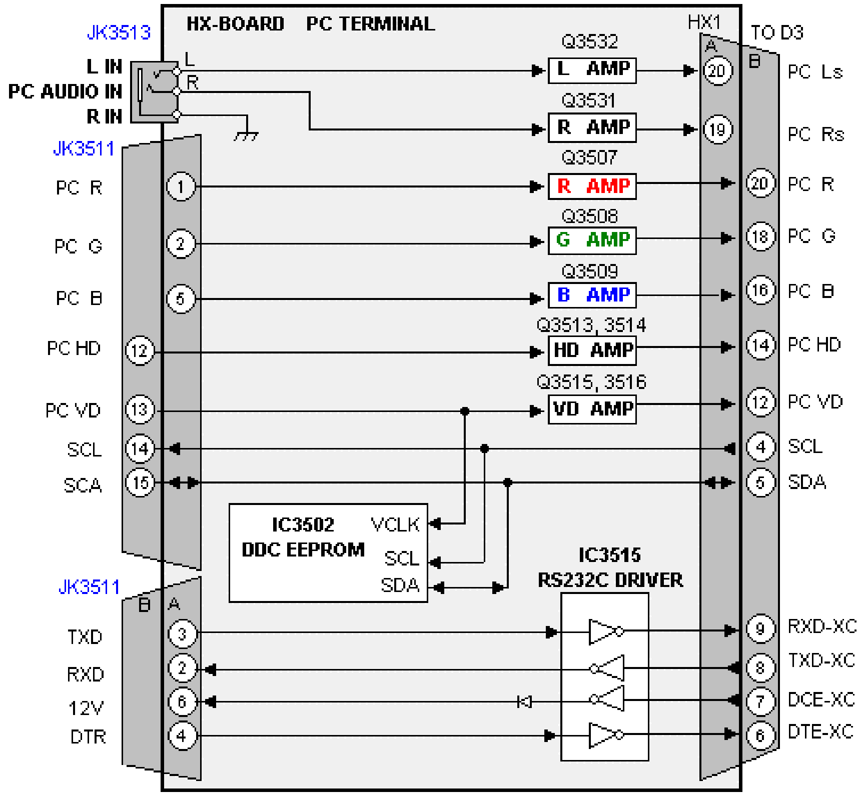


Figure 14

PC RGB Signals are input to the HX Board. The RGB signals as well as the vertical and horizontal sync signals are amplified by a series of transistor amplifiers. The RS232C communications bus line is also connected on this board. The RS-232C connection is provided so that operation changes can be made via PC. An example of an application of this port would be remote turn on of the unit for a kiosk or similar display.

The outputs of the HX board are applied to the D1 board via connector HX1/D3.

D1 Board

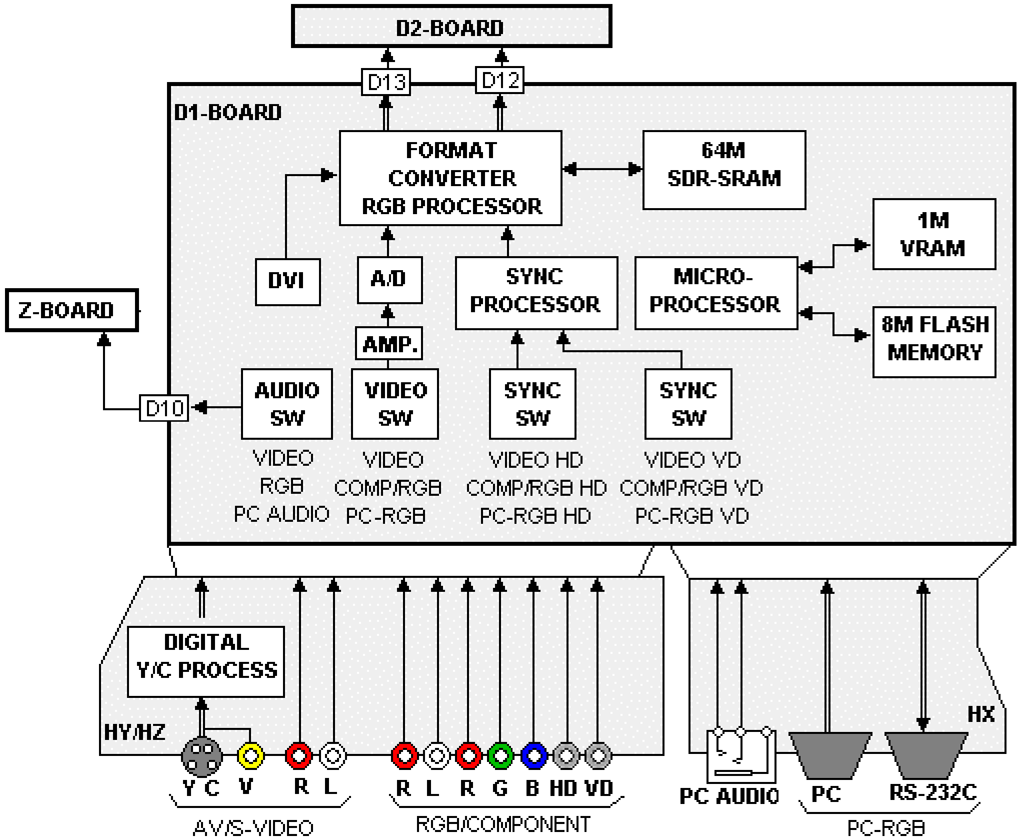


Figure 15

After the input signals are amplified by the HY/HZ and HX boards the desired signal is selected. The microprocessor sends the command via the IIC bus to the input select switch (IC3001). The video switch selects from one of the three inputs. The component video signal output from the video switch is amplified and converted to digital. An optional Digital Visual Interface (DVI) input bypasses the A/D process as DVI information is already in the digital format.

Concurrently, the desired sync signals are selected and applied to the Sync Processor. NTSC and Component sync signals are stripped from the Green video component while the PC sync is applied directly. The Sync Processor combines the On-Screen Display Sync signal with the input sync and converts them to match the video format.

The corresponding audio signal is selected by an Audio switch and applied to the Z board for further amplification

DVI Interface

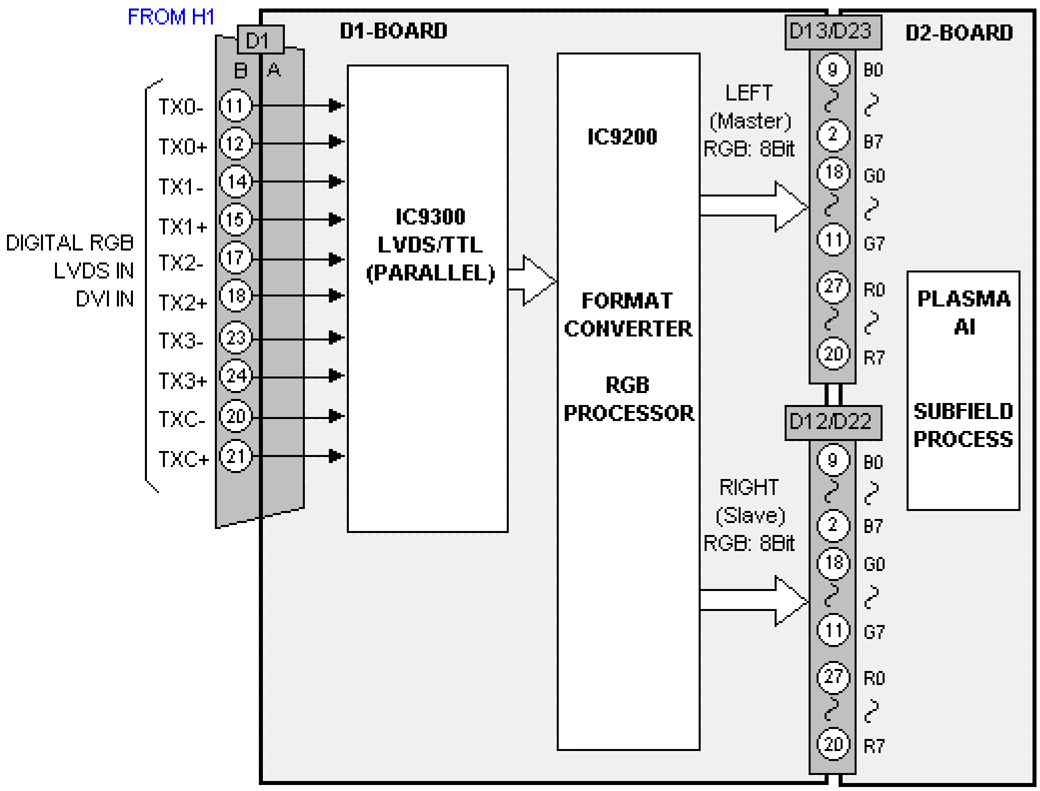


Figure 16

An optional Digital Visual Interface (DVI) module connection is provided on this generation Plasma Display Panels. The DVI interface allows direct digital transfer from a display device to the panel. A VGA or component video signal requires a conversion from the digital to analog and then conversion back to digital prior to input to the Format converter see Figure 17. The double conversion can introduce distortion to the signal.

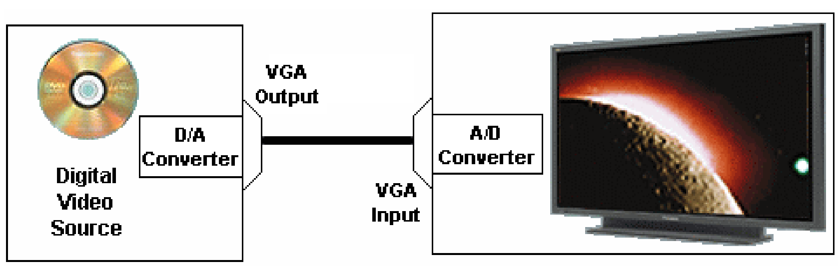


Figure 17

Figure 18 shows an example of the DVI interface. It permits direct connection of the digital video signal to the Format converter. This bypasses the D/A and A/D process providing the better quality picture.

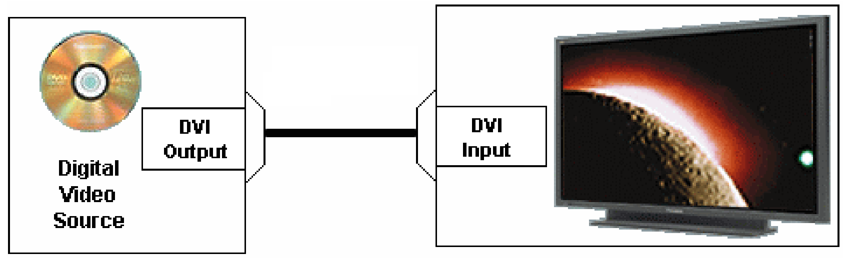


Figure 18

Installation of the DVI interface requires removal of the HY/HZ Board and replacing it with an optional DVI interface board.

Sync Process

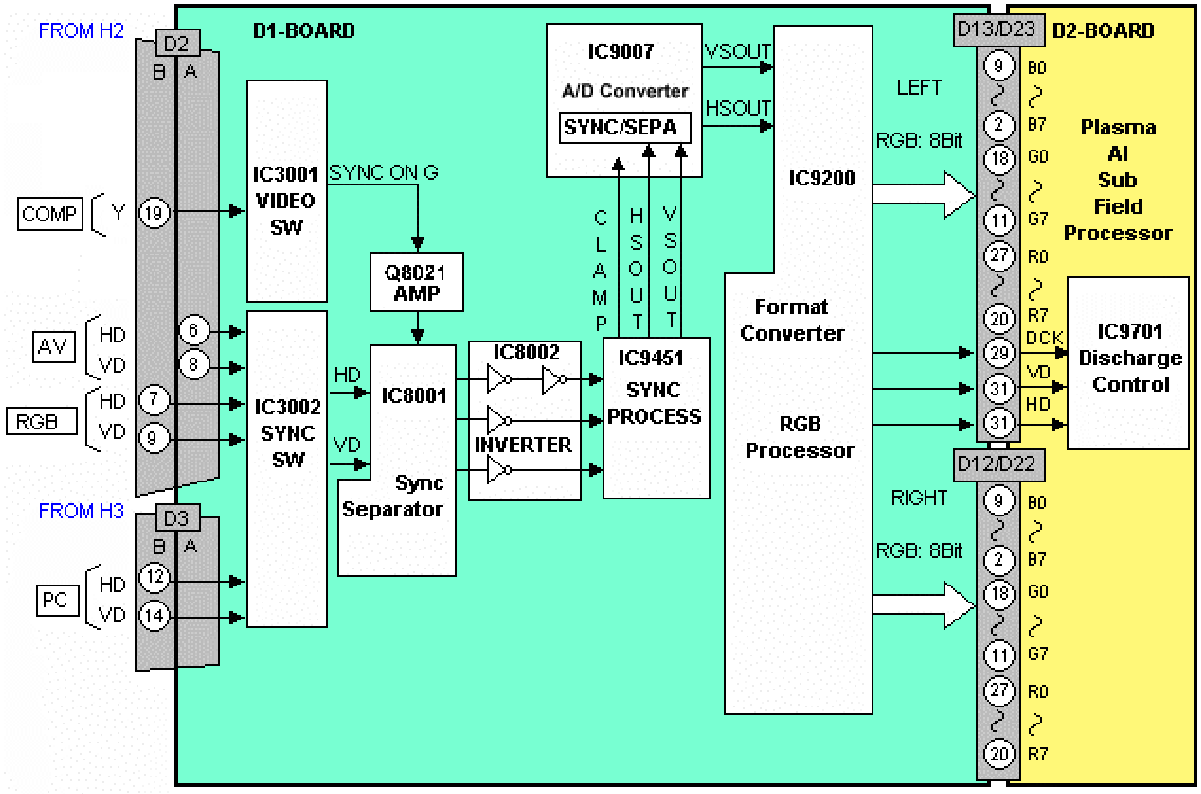


Figure 19

The vertical and horizontal sync signal paths are slightly different depending on the Source signal.

AV/RGB/PC Input Mode Sync

The vertical and horizontal sync signals generated by the input device are applied to connector D3 or D2 to a Sync switch (IC3002). IC3002 outputs the vertical and horizontal sync signals. The signals are inverted by IC8002 and then applied to a sync processor (IC9451). IC9451 mixes the image sync signal with the OSD sync signal prior to output to the format converter (IC9200).

Component Video Input mode Sync

The Y video signal is applied to an input switch (IC3001). The Sync on green signal is amplified by Q8001 and applied to a sync separator (IC8001). IC8001 outputs the Vertical and Horizontal sync signals. From that point on the sync path is the same as the RGB/PC input mode.

The A/D converter (IC9007) shapes the analog sync signal to clean digital pulses prior to input to the format converter.

D1 Board

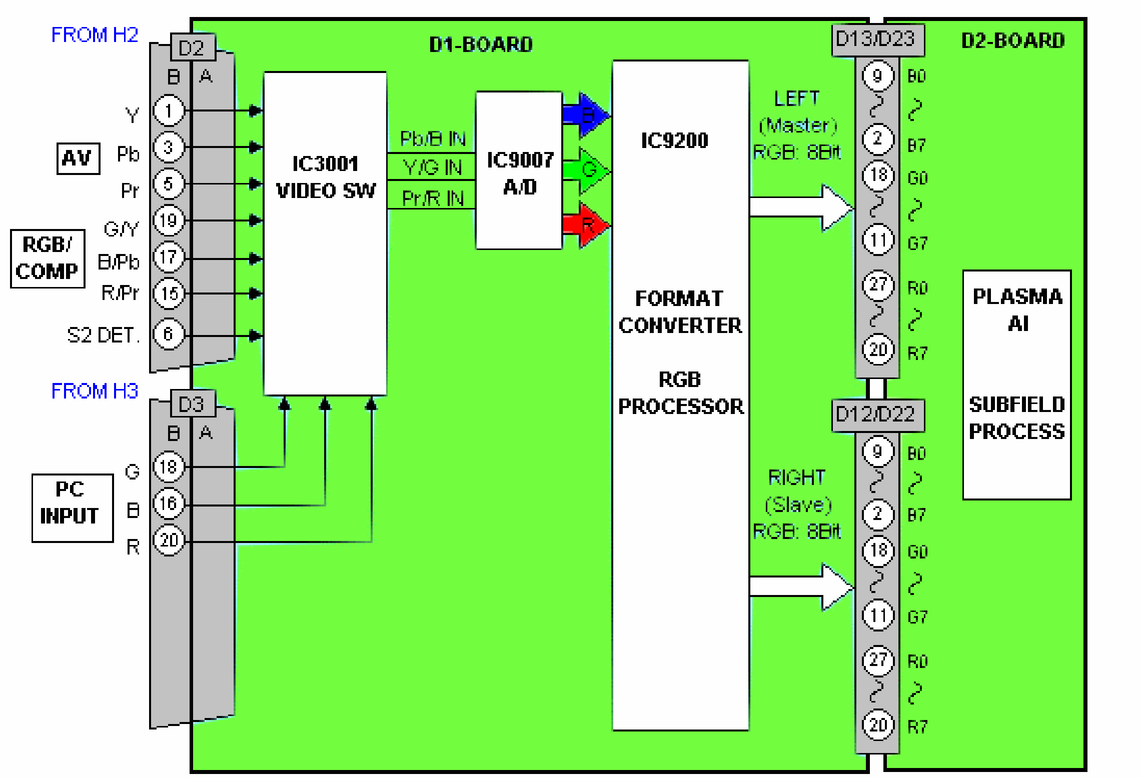


Figure 20

D1-board consists of the Analog and Digital signal process. It also contains the Discharge control and Microprocessor control block. Supply voltages of 13.5V, 5V, Standby 5V, 3.3V, and 1.8 V operate the D1-board. The input RGB video signals are at 0.7Vp-p. Video signals in the form of parallel data and the control signals for the data drive circuit are output.

D1 Main ICs Operation

IC3001 Video Switch

The user selects the desired video input using the front panel button or the remote control. The microprocessor reads this data and sends out a command via the IIC bus line. The IIC data is read by IC3001 and the video input is chosen.

IC9007 A/D Converter

This integrated circuit converts the RGB analog signals to eight bit parallel data.

IC9200 Format Converter

The digital video data is converted to progressive scan and mixed with the OSD data. Other adjustments such as white balance, contrast and color are also corrected here. The two channels of data are output to the D2 board for the sub-field drive circuit.

D2 Board

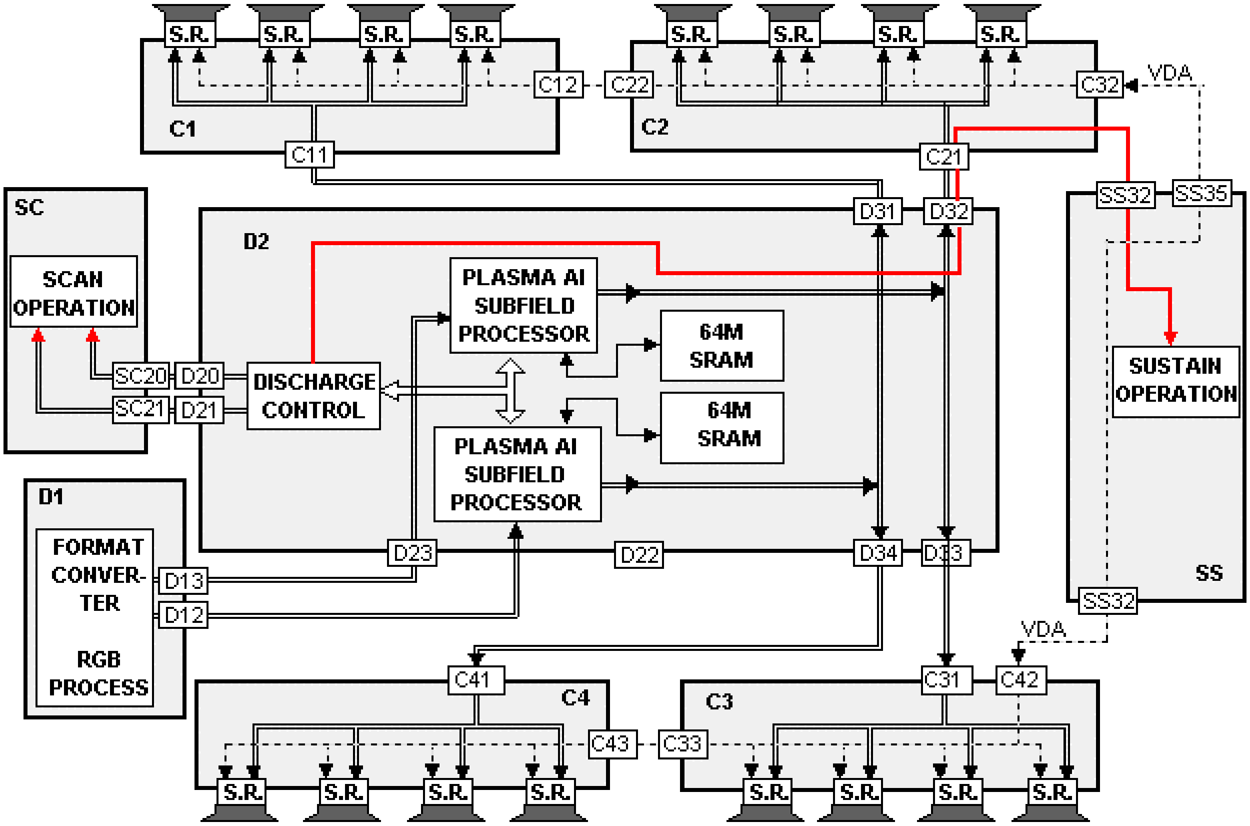


Figure 21

The D2 board provides the scan, sustain and data drive signals. The scan pulses are output to the SC board. The sustain pulses are output to the SS board. The data drive signals are output to the C1, C2, C3 and C4 boards. The C1 board drives the Upper right portion of the panel; the C2 board drives the upper left portion. The C3 and C4 boards drive the lower right and left portions of the panel respectively.

D2 Board details

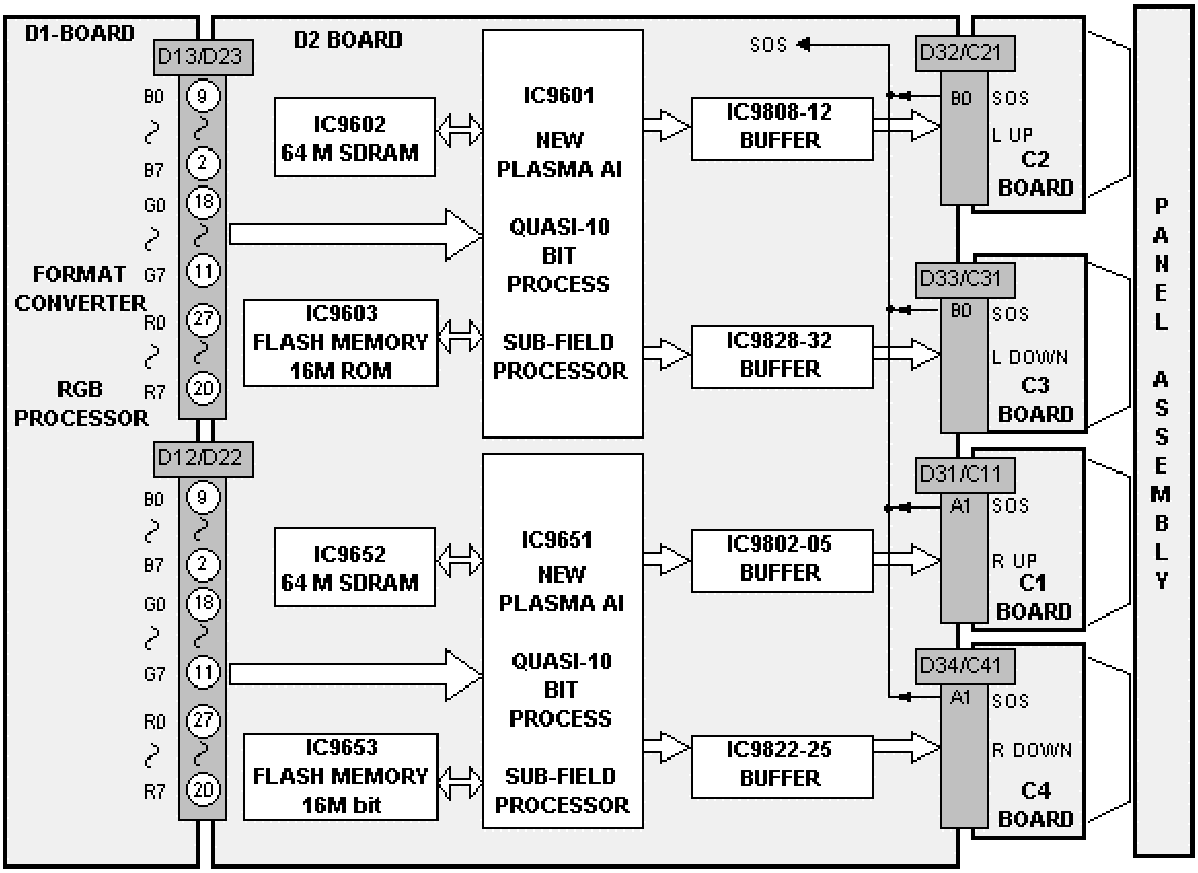


Figure 22

The Plasma AI (Adaptive brightness Intensifier) circuits analyze the video program level for the distribution of dark and bright components. The upper and lower eight bit video signals are memorized into two Plasma AI processors IC9651 and IC9601. The Plasma AI circuits converts the 8 bit signal data to 10 bit signal data. The Flash memories contain the algorithms for the AI circuit. Two AI processors are used to speed up the scanning process and control the number of sustain periods. This increases the brightness and improves the contrast ratio.

SC Board Explanation

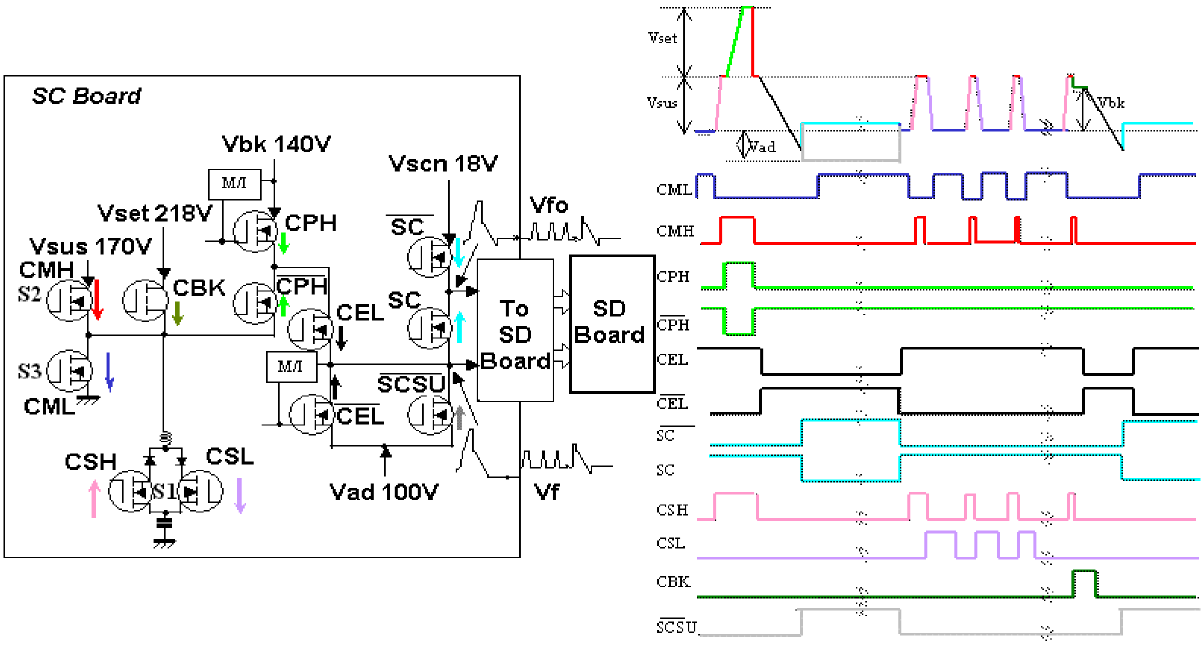


Figure 23

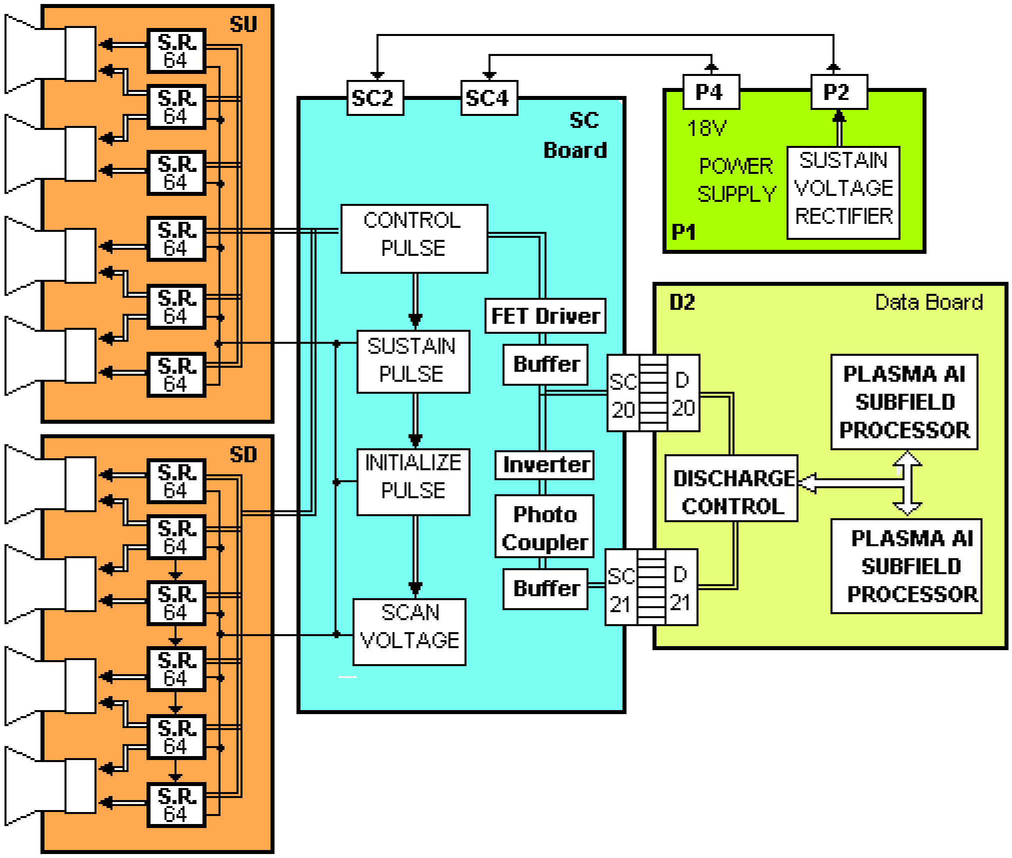


Figure 24

The SC Board consists of buffers and drivers used to generate the scan signals to the panel. The buffers provide isolation between the D2 board and the drivers. Connector SC20 provides the drive voltages (140V, 100V and 18V). Connector SC21 provides trigger signals to switch the FET transistors. The D2 board switches the FETs on and off to create the distinctive scan signal. Each trigger signal switches a drive FET creating a portion of the waveform. For example, applying the CPH signal to the 140V FET creates the peak portion of the waveform, see figure 23.

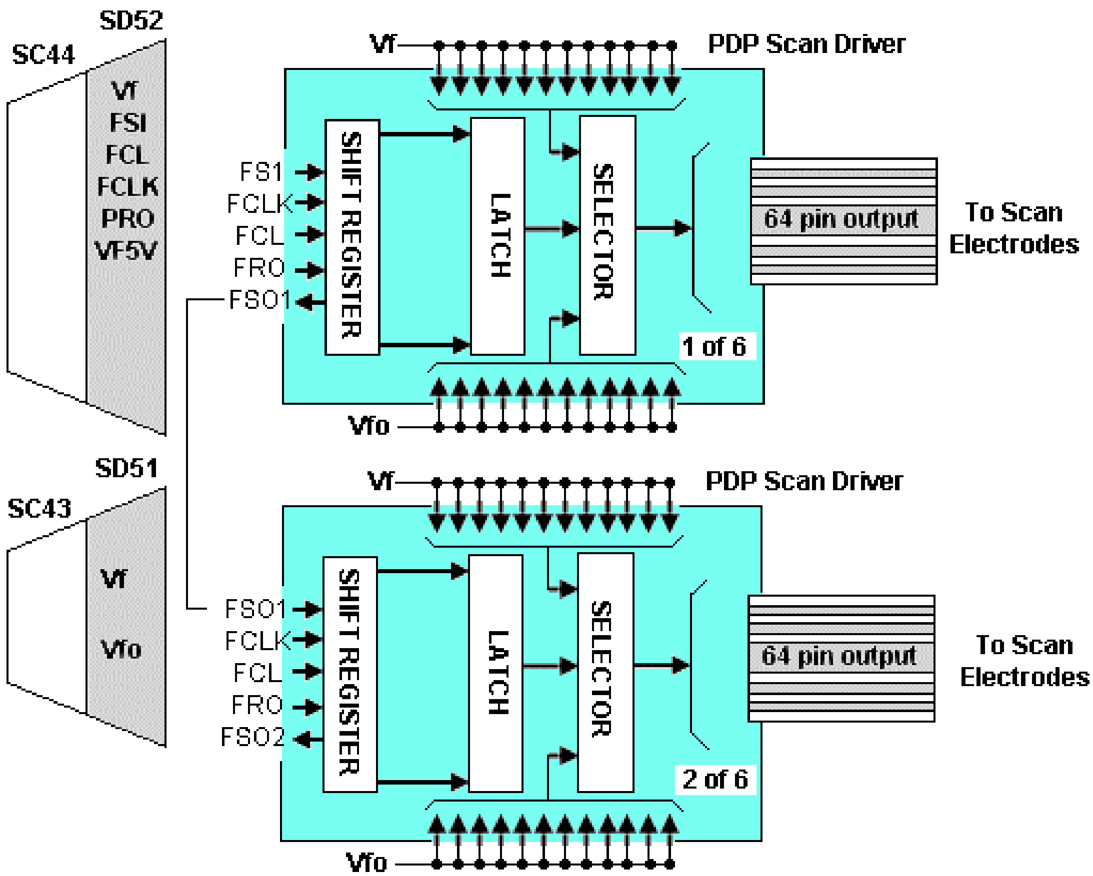


Figure 25

After the scan waveform is developed on the SC Board, it is applied to the SU and SD boards for de-multiplexing. The signal is input to a series of shift registers inside the PDP scan driver IC. Figure 25 shows an example of the de-multiplexing circuit. There are six driver ICs on the SU board and six on the SD board.

SS Board Explanation

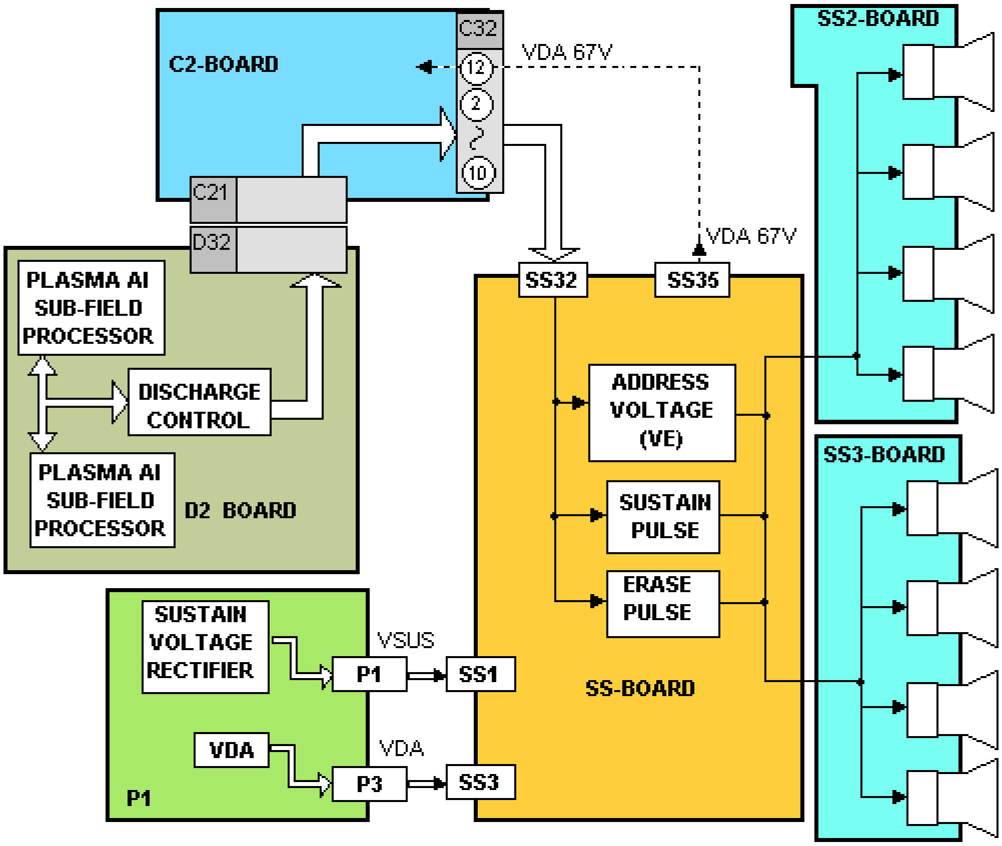


Figure 26

After the video signal is processed on the D2 board, the sustain and erase pulses are output to the SS board. The erase pulse is output at the beginning of each scan period. The pulse is applied to the SS2 and SS3 boards to remove the previous charge for the upper and lower sections of the display panel.
The sustain pulses are also developed on the D2 board and are applied after the scan periods.

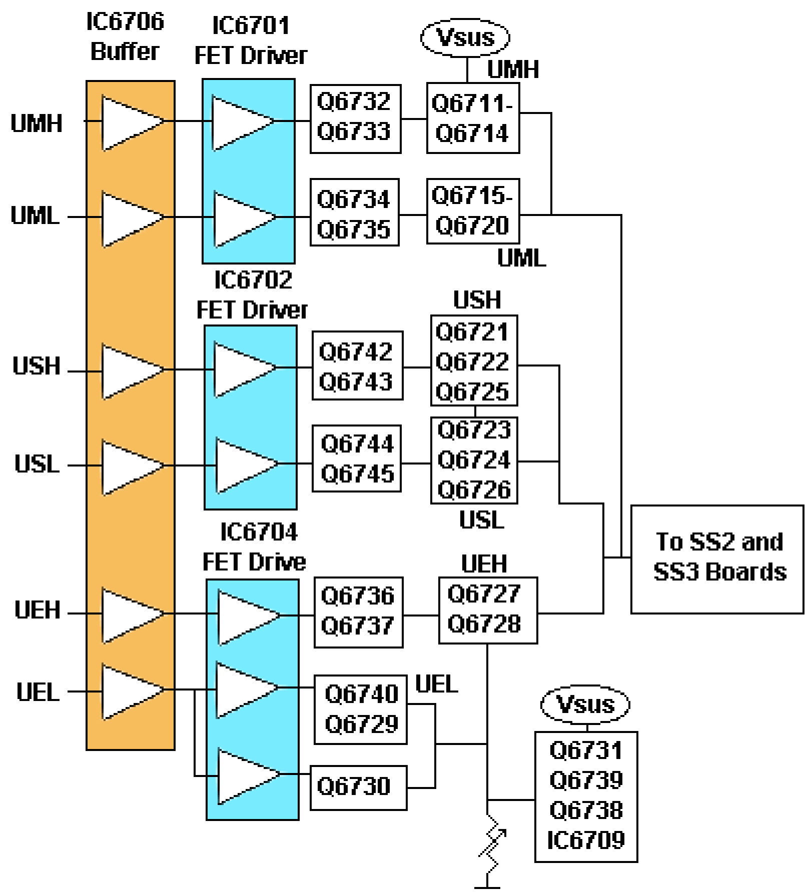


Figure 27

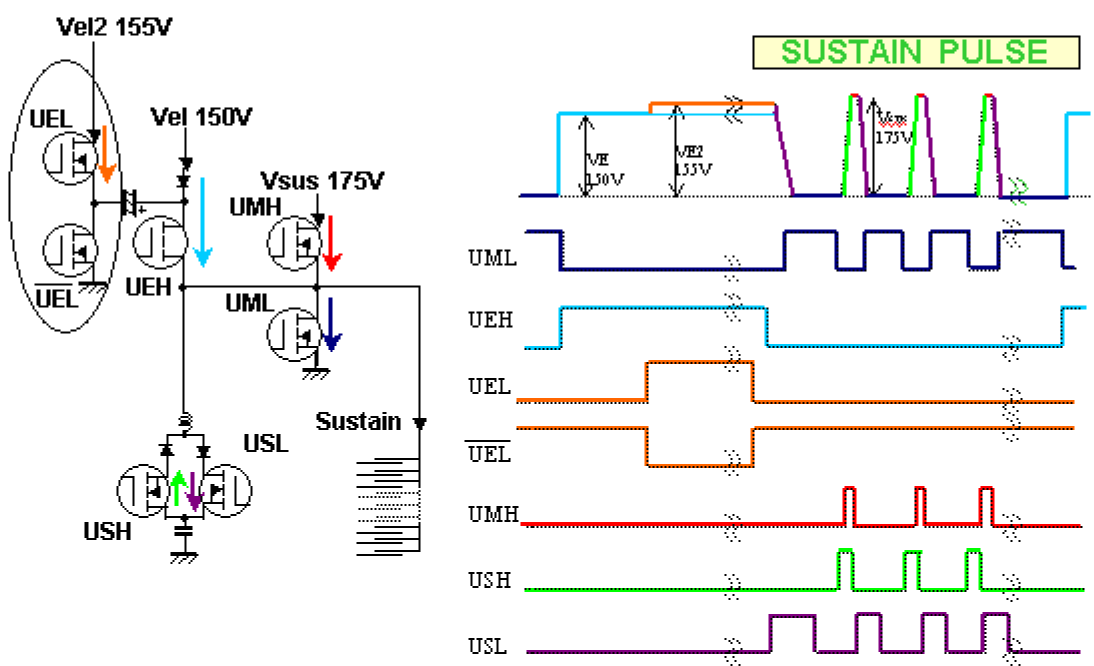


Figure 28

The Sustain pulse is developed using a similar circuit as the Scan Pulse. A series of specifically timed pulses are applied to FET drivers creating the distinctive sustain pulse. The drivers switch the voltages (150V, 155V and 175V) at selected intervals determined by the D2 board. The basic waveform remains constant but the exact number of sustain pulses is determined by the amount of luminance required, see figure 28.

Power Supplies

Standby Power Supply

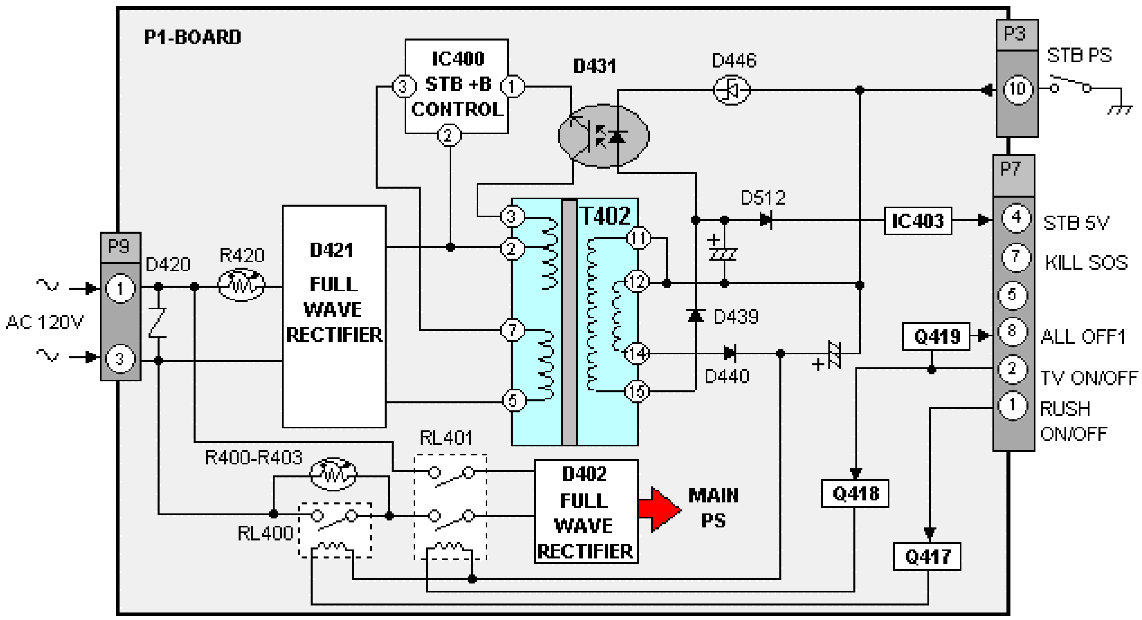


Figure 29

The standby power supply provides the necessary DC voltage for the system control Microprocessor, Reset circuit and the EEPROM. D421 rectifies the incoming AC Voltage and applies it to the transformer T402 and the standby B+ control circuit IC400. The output pulses of IC400 are then applied to the primary side of transformer T402. Diode D439 rectifies the AC output at pin 15 of the secondary of T402 to create STB (Standby) voltage for the system control circuit. The AC output at pin 14 of the secondary of T402 is rectified by diode D440 to create the DC voltage for the power relays. Transistor Q418 creates the ground path for power relay RL401. Transistor Q417 provides the ground path for the In Rush Current relay RL400. The Opto-coupler D431 provides feedback to the STB control circuit for voltage regulation.

Main Power Supply

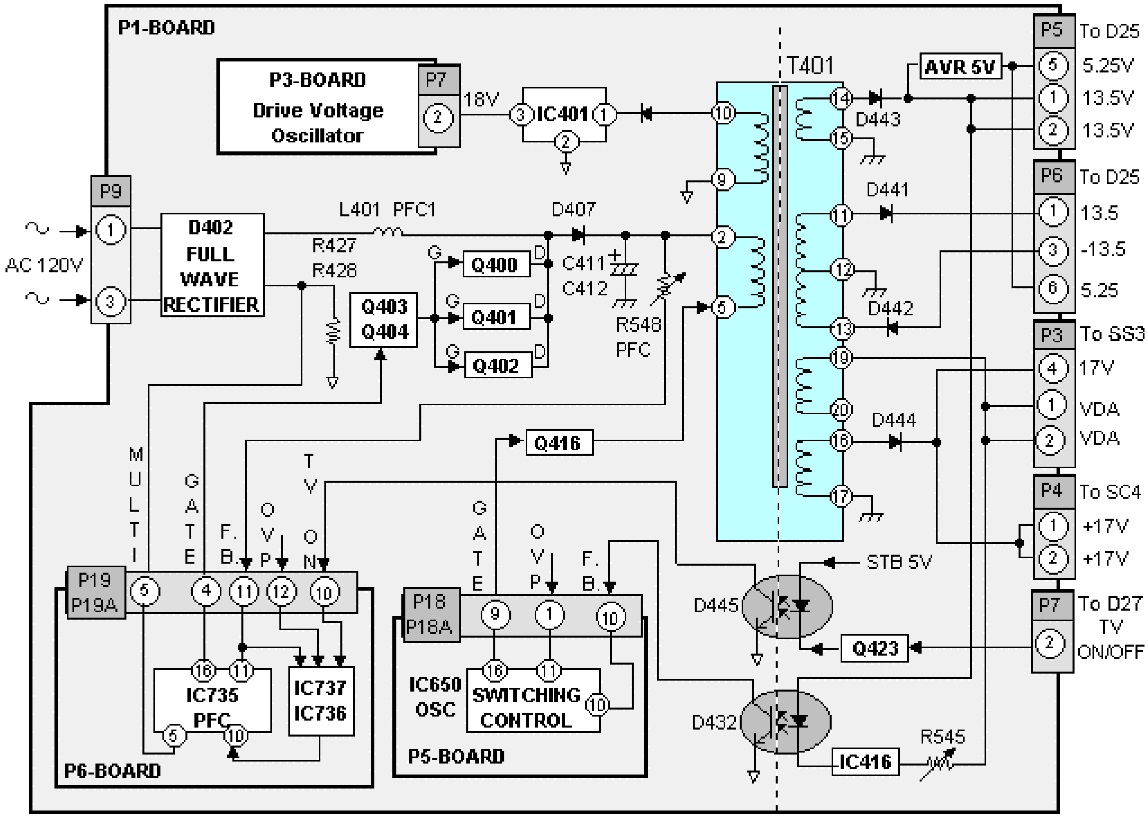


Figure 30

Power Factor Control

The power factor control circuit operates like a boost regulator. The incoming AC voltage, after being switched on, enters the rectifier D402 where it is converted to DC. The Power Factor Control (PFC) circuit converts the DC level to 400Vdc. The negative side of the bridge rectifier D402 connects to ground via a resistor. As current flows through the resistor, the resulting voltage drop enters pin 5 of connector P19/P19A of the power factor control circuit board. The power factor control circuit board is a switching control oscillator circuit which boosts the input voltage at pin 2 of the transformer T401 to 400Vdc. As the pulses are output at pin 4 of connector P19/P19A, the transistors Q400~Q405 are switched On/Off controlling the charge and discharge time of the inductor L401. The output voltage is monitored via pin 11 of the connector P19/P19A. The resistor R548 adjusts the output voltage to 400Vdc. The 400Vdc output to pin 2 of the transformer T401 subsequently enters the drain of transistor Q416.

Low Voltage Power supply

VCC and Start-up voltage for the low voltage power supply is provided to IC650 of the P5 Board by the standby power supply circuit (not shown). Upon start-up of the switching control circuit, a pulse width modulated signal is output at pin 9 of connector P18/P18A to drive the switching transistor Q416. When Q416 is on, current flows via the primary winding of transformer T401 and Q416. As current flows through the transformer, energy is built up and stored in the transformer. When Q416 turns off, the energy within the transformer begins to collapse. As the field collapses, energy is released in the windings of the transformer to provide the secondary voltages.

The rectified AC output at pin 10 of transformer T401 is applied to IC401 where it is regulated to 18V. This voltage is used to power the Drive Oscillator circuit board that will be discussed later.

Voltage Regulation

The 13.5V source and the VDA source voltage levels are monitored by IC650 of the P5 Board. A voltage increase of the 13.5V or an increase in the current flow of the VDA source causes IC416 to conduct harder, allowing more current to flow through the LED inside opto-coupler D432. This increases the conduction of the transistor inside D432. Conversely, a decrease in the 13.5V supply voltage or a decrease in the current flow of the Vda source decreases the conduction of IC416. Any change in the conduction of IC416 is monitored by pin 10 of IC450. As a result, the pulse width modulated output at pin 10 of IC650 adjusts to keep the output level of the power supply constant. R545 is used to adjust Vda to the proper voltage level.

High Voltage Power Supply

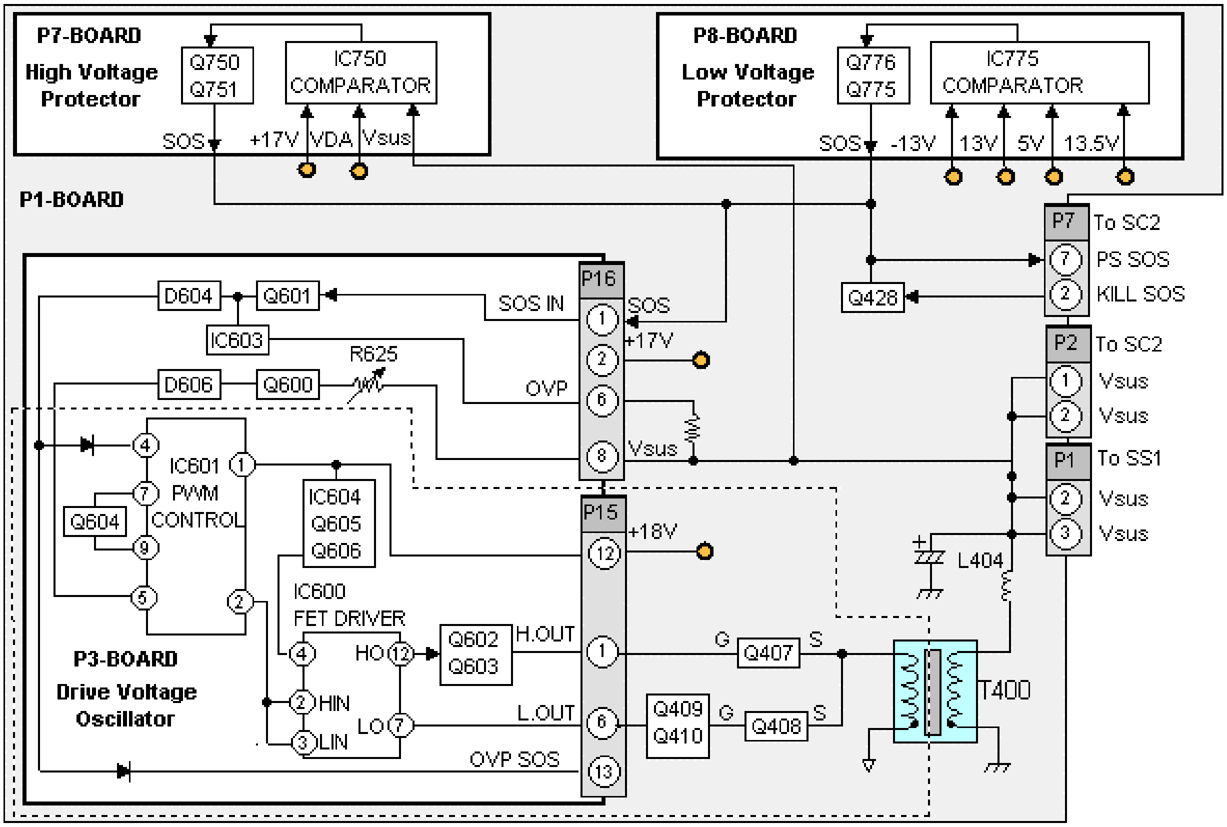


Figure 31

The P3-Board contains the drive voltage oscillator circuit that develops the Vsus voltage needed to drive the Scan and Sustain boards. Operation begins with the 18Vdc supply being applied to pin 12 of connector P15. This voltage serves as start up voltage for IC601. Q604, connected to pin 7 and 9 of the IC, provides Oscillation control. The oscillator generates a trapezoid pulse that is input to a PWM circuit (not shown) to control the output voltage. The PWM output at pin 2 of IC601 is applied to pin 2 and 3 of IC600. This IC is a wave driver that provides two square wave outputs at opposite polarity. The two signals are then output to the P1 board as H OUT at pin 1 and L OUT at pin 6 of connector P15. Amplification of the two signals is performed the transistors Q407, Q408, Q409, Q410 before being applied to the transformer T400. The output of the transformer is provided to the SC-Board via pin 1 and 2 of the connector P2 and to the SS board via Pins 2 and 3 of the connector P1.

Voltage feedback is provided via pin 8 of connector P16. This voltage enters pin 5 of IC601 for voltage regulation. R625 is used to set the output at the desired level.
Note: The voltage level of the Vsus output is not mentioned because it is different for each plasma display panel. This voltage level can be found on the panel information label located on the heat sink of the panel.

Over-voltage protection (OVP) is provided via pin 6 of connector P16. This voltage enters pin 4 of IC601 for immediate shutdown of the IC if the Vsus voltage rises to an undesired level. The OVP feedback is also provided to the system control circuit via pin 13 of connector P15 for immediate shutdown of the entire unit.

The P7 (High Voltage Protector) and P8 (Low Voltage Protector) circuit boards monitor the DC output of all power supply boards. If any of the inputs is higher than the desired level, a DC level is output via the “SOS IN” line to pin 1 of connector P16. The operation is the same as the OVP input at pin 6 of the connector P16.

Protection Circuits

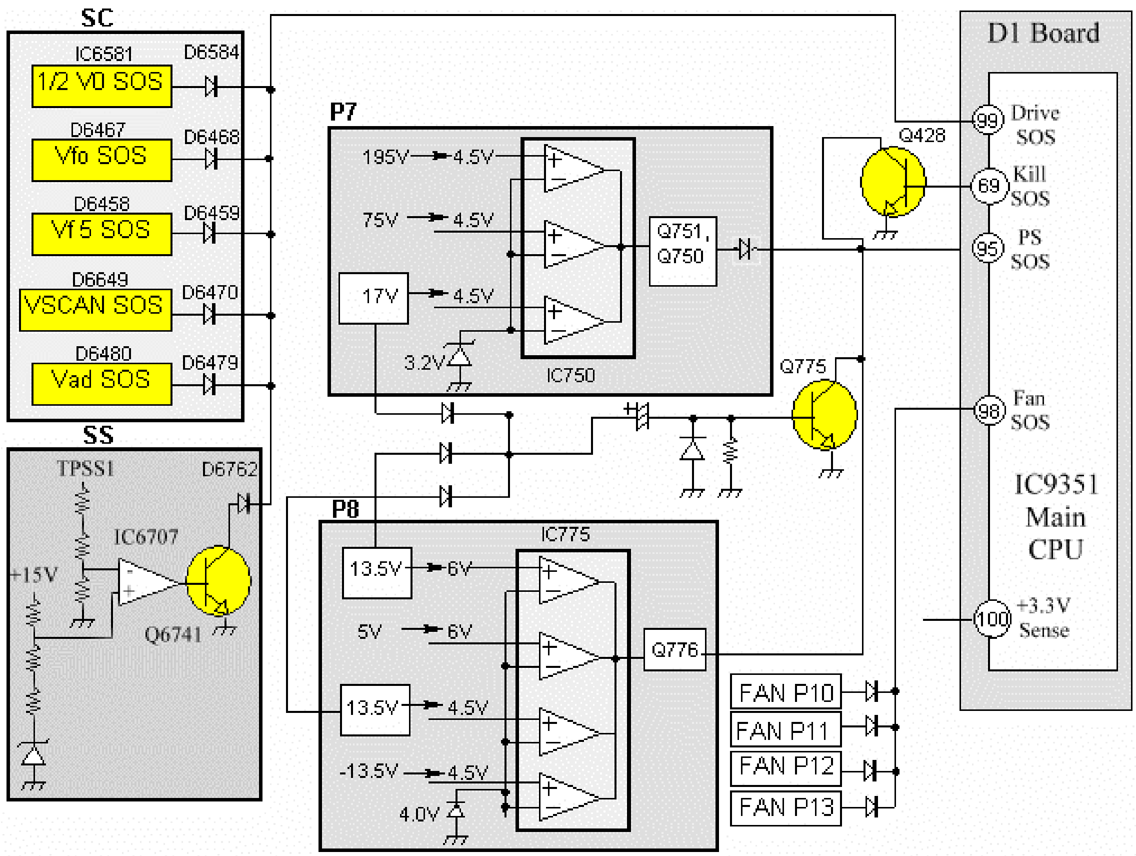


Figure 32

Protection circuits are incorporated in the unit to prevent the failure of a single circuit or component from creating catastrophic damage.

The P7 and P8 boards are daughter boards on the P1 main power supply board. The P7 board monitors the Vbk (195V), Vda (75V) and +17V supply voltages. The voltages are fed through individual voltage dividers and the result is compared to a 3.3V reference voltage by a comparator IC750. If any of the voltages drop low, the comparator outputs a low triggering Q751. Q751 triggers Q750 on, applying a high to pin 95 of the main CPU IC9351.

The circuitry on the P8 board monitors the plus and minus 13.5V lines used by the audio circuit, the +5V line and another +13.5V line. If any of these supplies were to drop, the comparator will output a low signal turning on Q776. Q776 conducts applying a high to pin 95 of the main CPU IC9351.

The four ventilation fans are monitored to be sure they are operating properly. If one of the fans opens or increases resistance, the resulting current change is applied to pin 98 of the main CPU.

The Scan and Sustain voltages on the SC and SS boards are monitored in a similar manner. The +15V Line on the SS board is fed to a voltage divider and

the result is compared to a reference voltage. The reference voltage is provided by a zener diode. If the output of the comparator goes high, Q6741 turns on effectively grounding the SOS line. The SC board uses a similar circuit to monitor the +17V line.

The SS and SC boards contain an LED indicator to alert the technician when a problem exists. The LED should be lit during normal operation, a dark LED indicates that a problem exists on that board.

Diagnostic Procedures

Self Check Display Indication

Self-check is used to automatically check the bus line controlled circuits of the Plasma display.

To get into the Self-check mode, press and hold the **Volume Down** button on the front of the unit, then the **OFF-TIMER** button on the remote control. The graphic in figure 32 should be displayed.

Note:
In case the H, HY or HZ boards are disconnected, “IC3699 - -” is displayed.

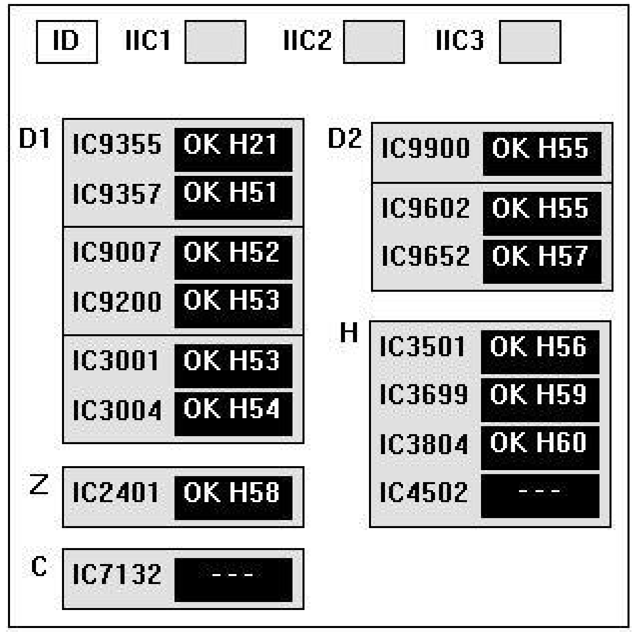
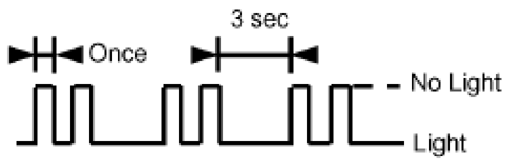
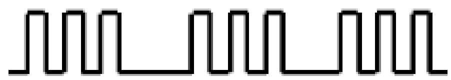
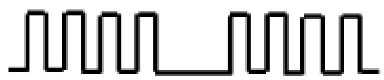
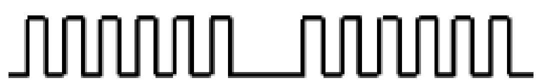


Figure 33

Power LED Flashing timing chart

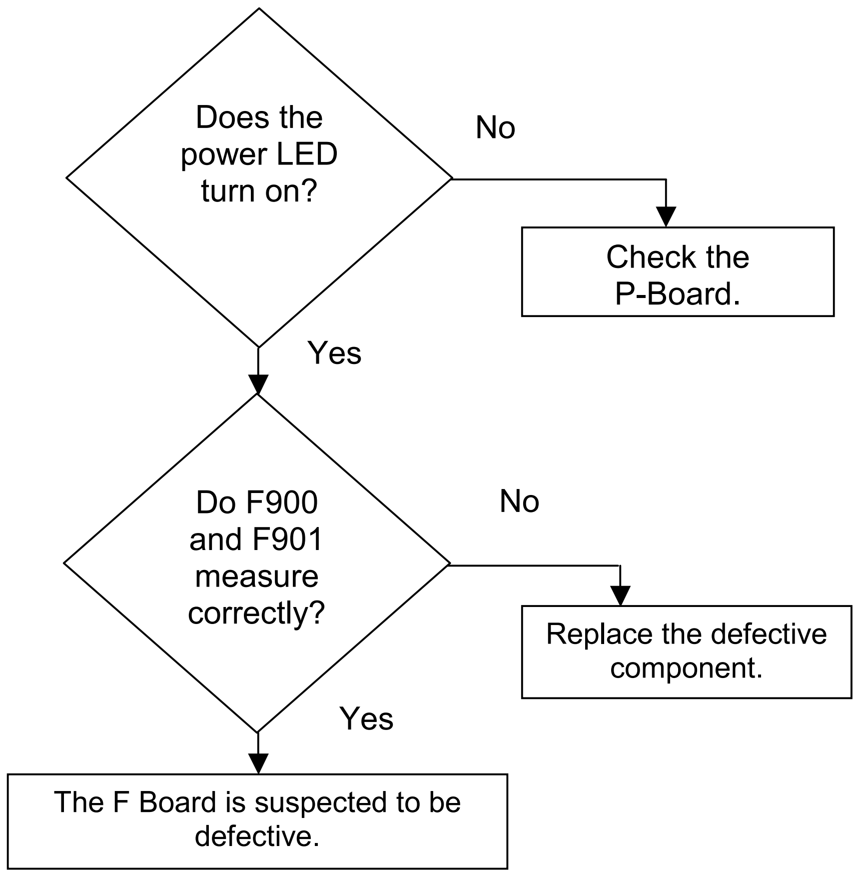
When an abnormality has occurred in the unit, the protection circuit operates and shuts off the power supply. The faulty area can be identified by the number of flashes of the Power LED at the front of the unit.

Blinking times	Blink timing	Contents & Check point
Twice		SC,SS,C-board
Three		D1-board
Four		P- board (Check P7,P8 protection circuits)
Six		Fan circuit / Fan stop Check Pin 3 of P10 to P13 connectors.

Diagnostic Flow Charts
No Power

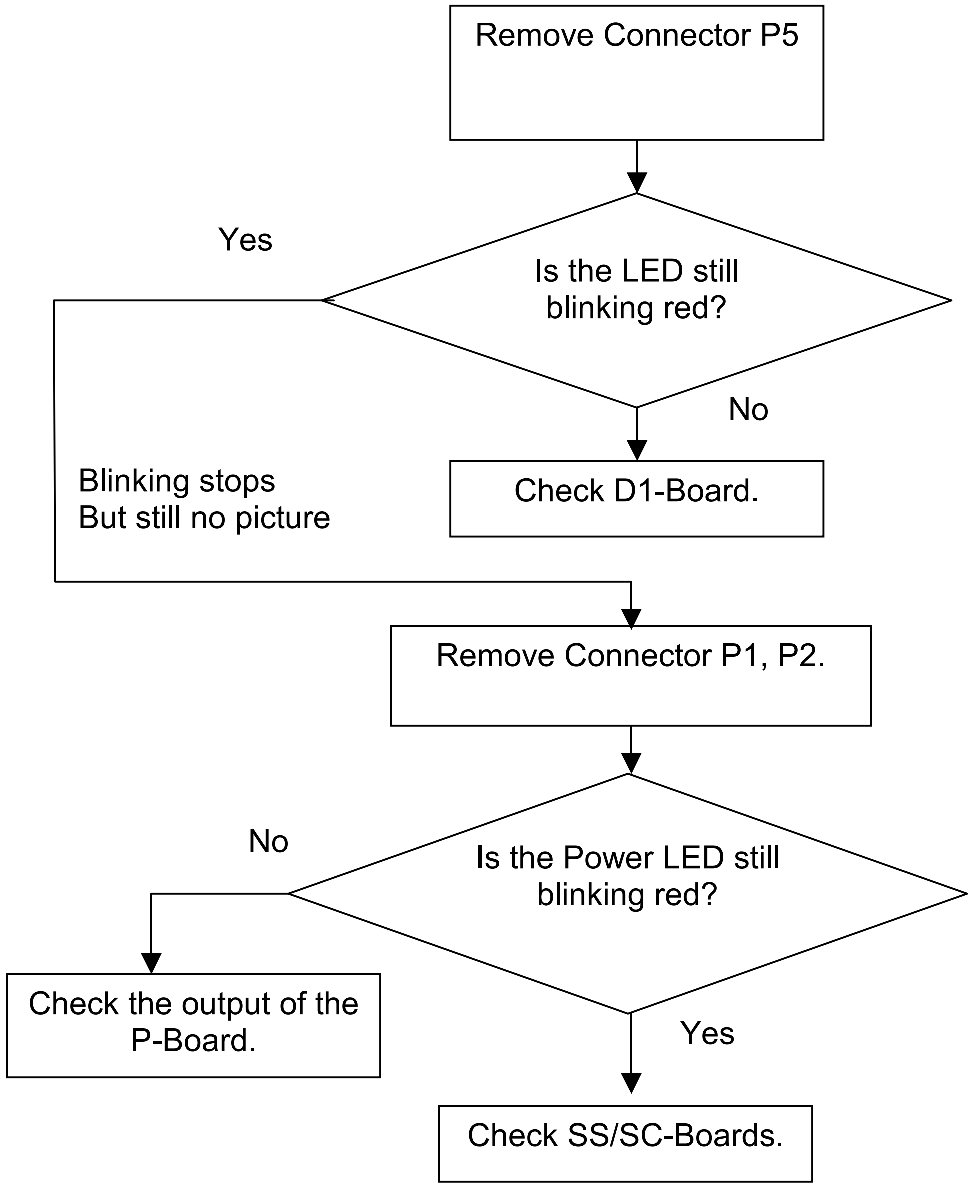
There are three states of “No Power” indication by the power LED:

1. The power LED does not light up.
2. The power LED is green at power up. It then turns red a few seconds later and blinks on and off.
3. The power LED is red at power up and never changes state.

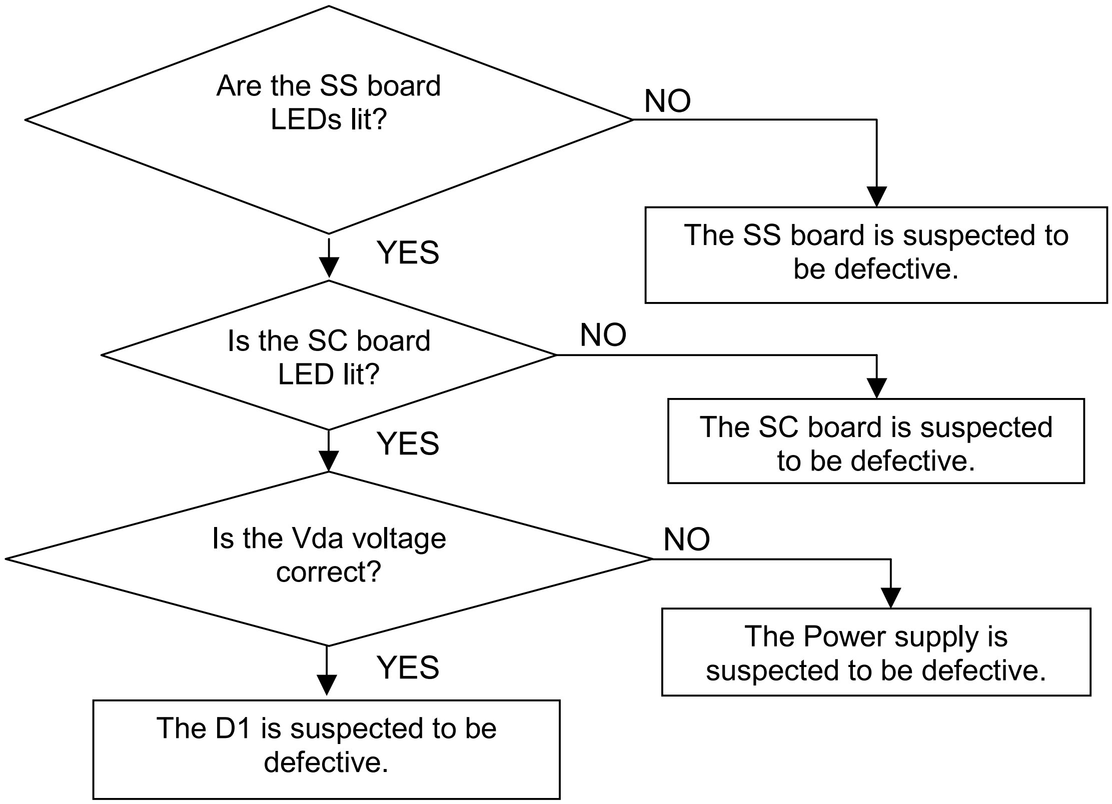


The Power LED is red and blinking on/off.

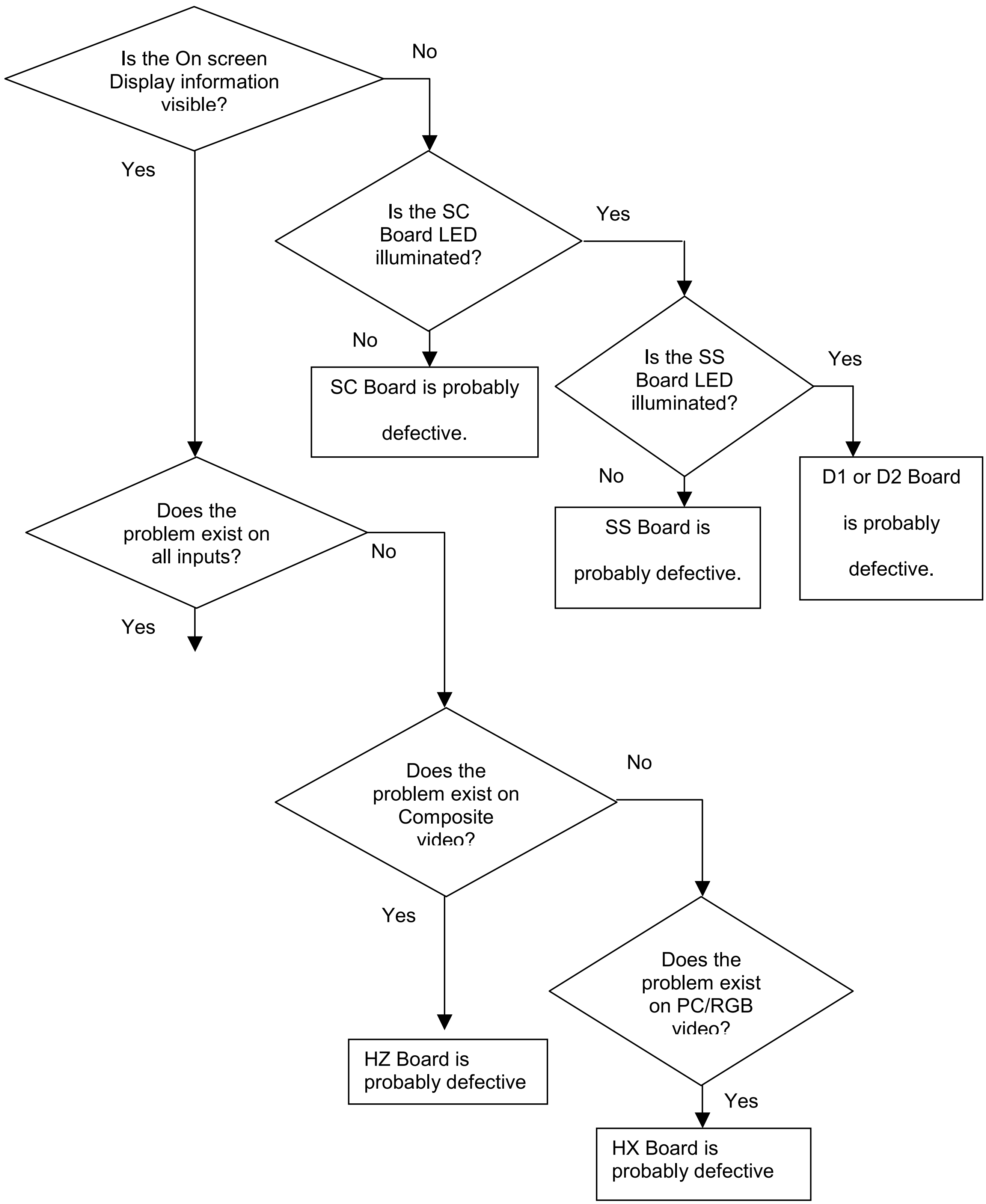
When one or more of the power supply voltages is missing, the red LED blinks on and off.



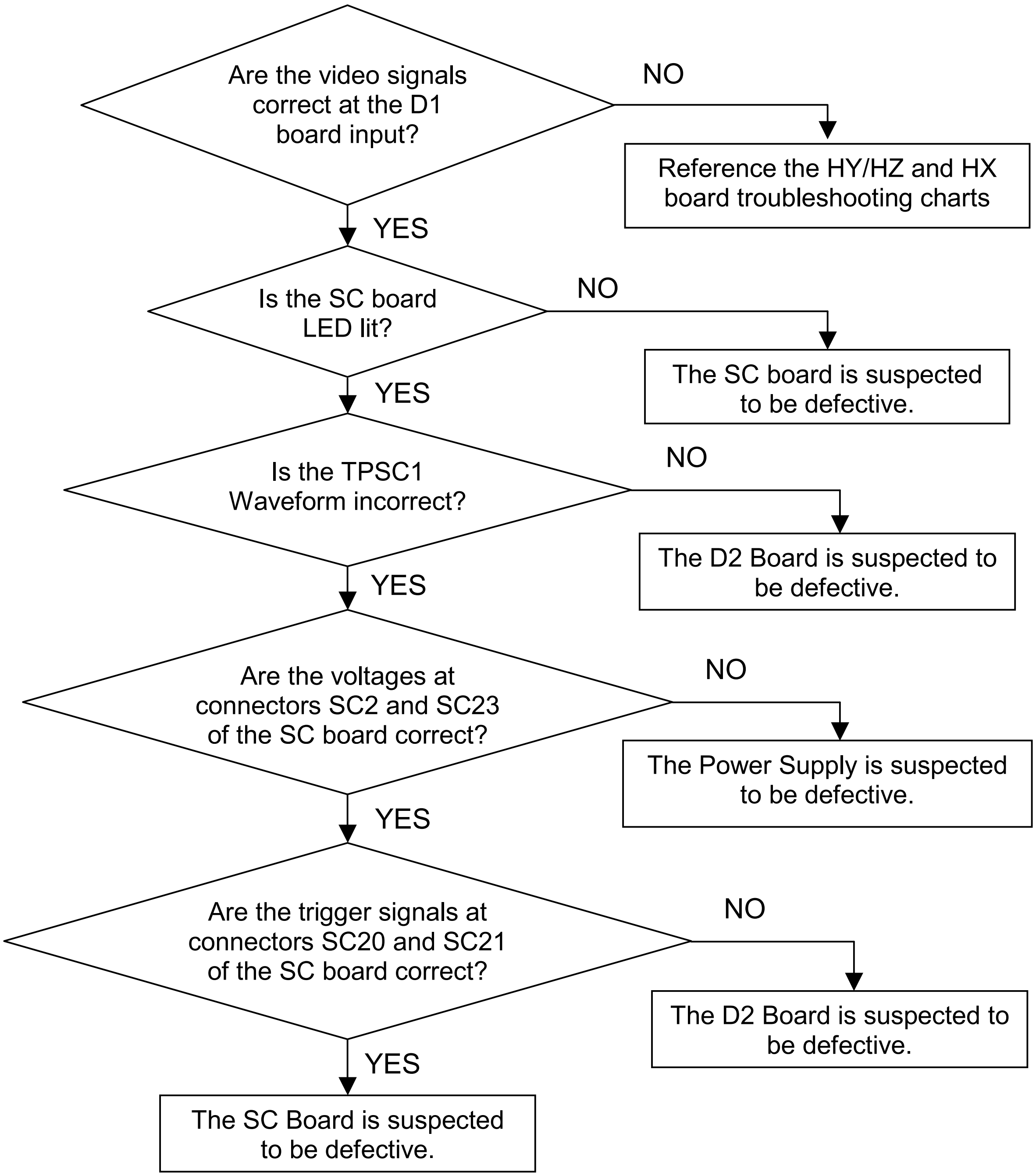
Power LED blinks twice



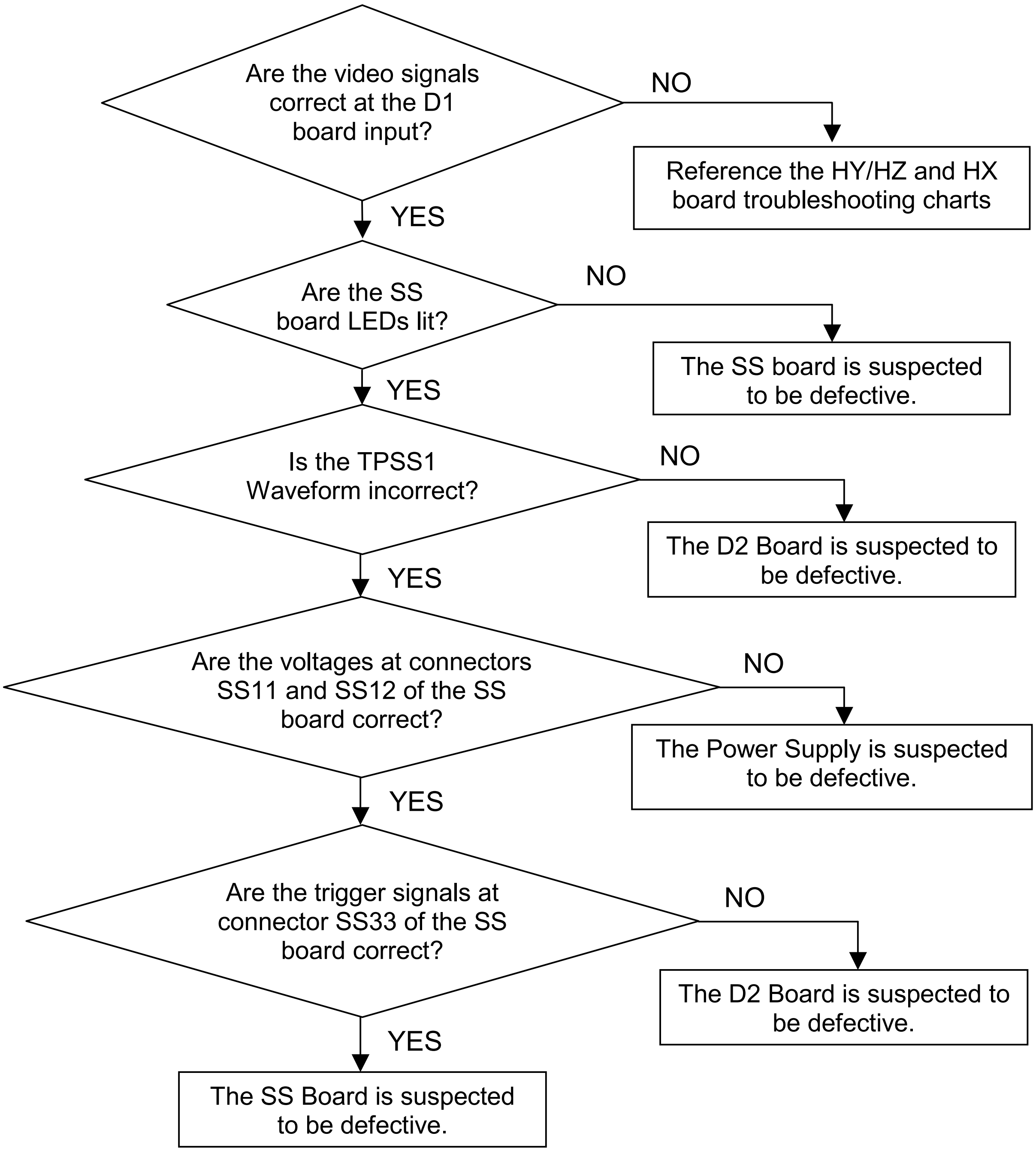
No Picture Flowchart 1



No picture Flowchart 2



Dark picture Flowchart



Local screen failure

The Plasma Display Panel unit may develop a failure, where the symptom is localized in a particular area of the screen. The figure below can help localize the circuit board that is most likely to be defective. In the example in figure 34, one of the two boards, C3 and D2 is likely to be the cause.

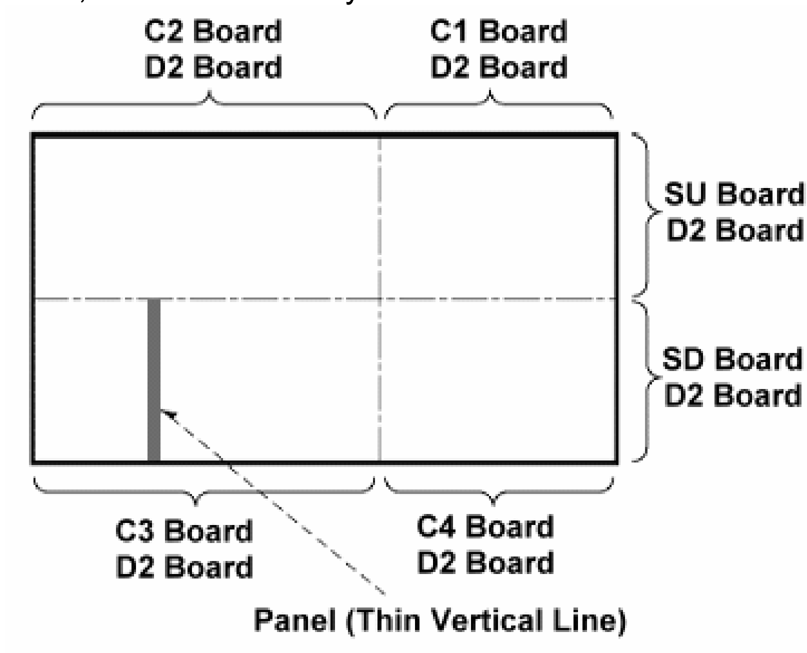


Figure 34

Service Hints

Symptom: No picture (black Screen)

- ❖ **Suggestion:** The use of a **magnifying glass** can help localize the defective printed circuit board. Use the magnifying glass to take a close look at the pixels of the screen.

  1. If the pixels are **totally dark**, the defect is most likely located in one of the following boards:

     a) SC-Board
     b) SU-Board
     c) SD-Board

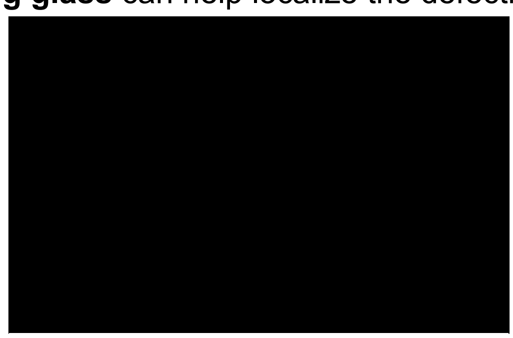


Figure 35

1. Check the status of the LED located on the SC-Board; if the LED is dark, a malfunction of the SC-Board is suspected.

2. Listen to the buzz noise of the SC board; if the buzz noise is not present, a malfunction of the SC-Board is suspected.

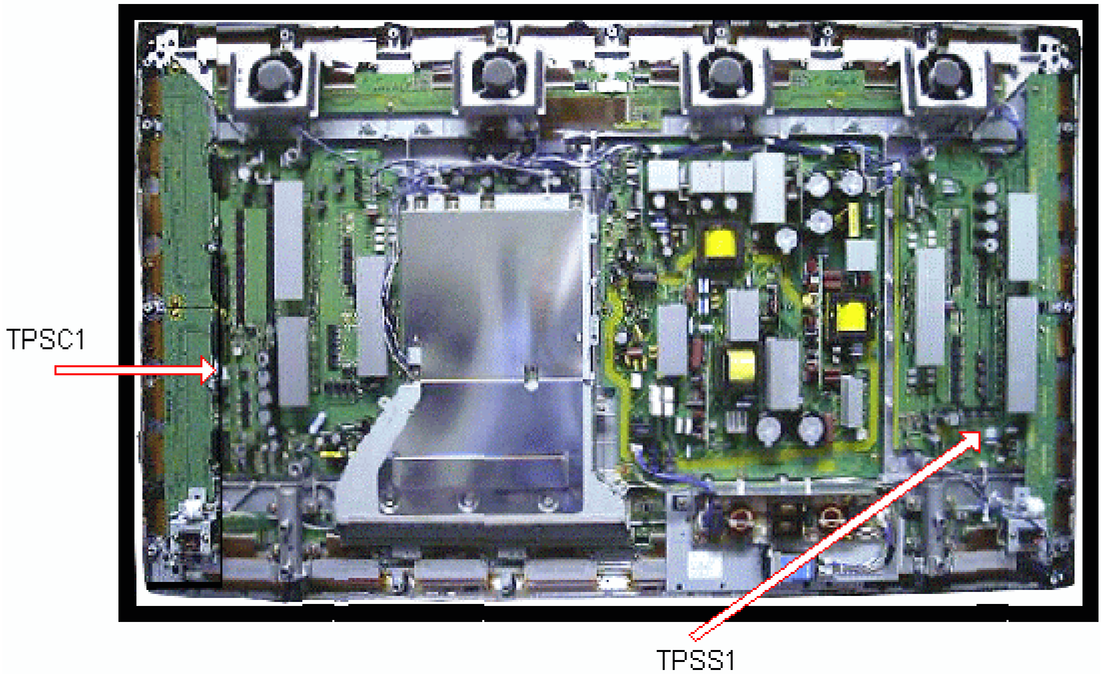


Figure 36

Suggestions: Check the Scan pulse waveform at TPSC1. (Use TPSS1 of the SS-board to trigger the oscilloscope.)
Verify the input signals at connector SC2, SC4, SC20 and SC21.
Verify that the signals of the clock and serial data lines from the D-board are present at connector SC20 and SC21.

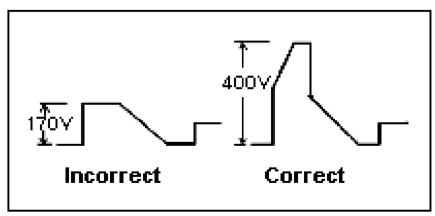
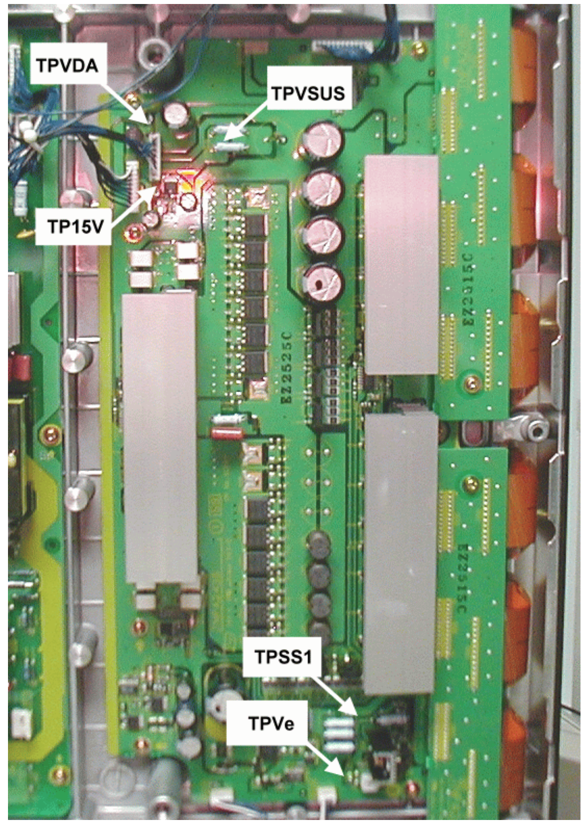


Figure 37

Symptom: No picture (black Screen)



Figure 38



SS Board
Figure 39

❖ **Suggestion:** The use of a **magnifying glass** can help localize the defective printed circuit board. Use the magnifying glass to take a close look at the pixels of the screen.

If the pixels are **faintly lit**, the defect is most likely located in one of the following boards:

A) SS-Board
B) SS2-Board
C) S3-Board

1. Check the status of the LED located on the SS-Board; if the LED is dark, a malfunction of the SS-Board is suspected.
2. Listen to the buzz noise of the SS-board. If the buzz noise is not present, a malfunction of the SS-Board is suspected.
3. Verify the input signals at connector SS3 and SS1.

Suggestions: Check the Scan pulse waveform at TPSC1 of the SC-Board. (Use TPSS1 of the SS-board to trigger the oscilloscope.) Proceed to check the power sources at connector SS11, SS12 and SS33.
Verify that the clock and serial data lines from the D-board are present at connector SS33.

Note: It is easier to measure input levels at connector C33 of the C3-Board instead of connector SS33.

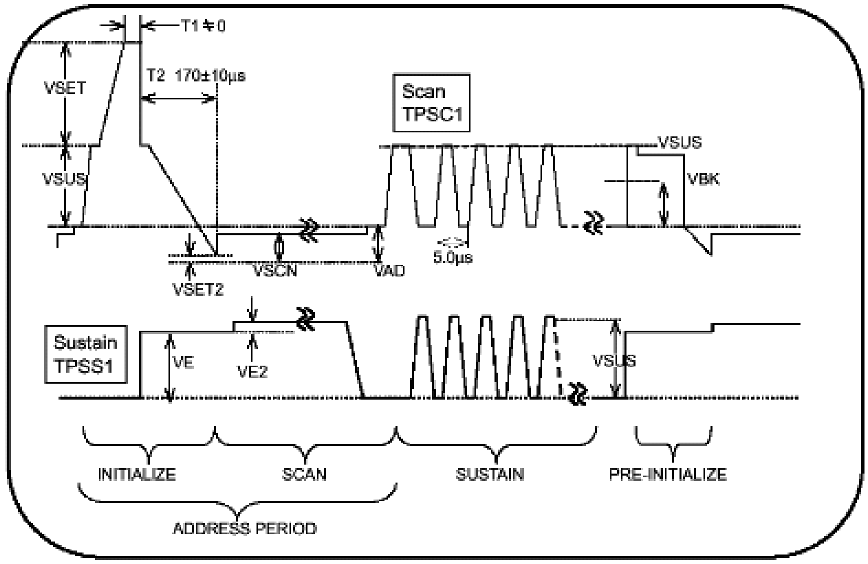


Figure 40

Symptom: Horizontal Black Bar
(Completely dark)

Note: The use of a **magnifying glass** can help localize the defective printed circuit board. Use the magnifying glass to take a close look at the pixels in the area of the black bar.

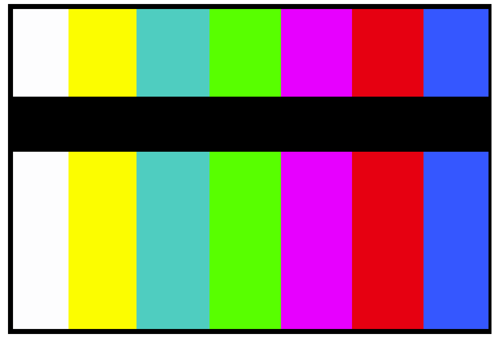


Figure 41

1 If the pixels are **totally dark**, the defect is most likely located in one of the following boards:
   a) SC Board
   b) SU Board (upper half of the screen only)
   c) SD Board (lower half of the screen only)

2. If the pixels are dimly lit, the defect is most likely located in one of the following boards:
   a) SS Board
   b) SS2 Board (upper half of the screen only)
   c) SS3 Board (lower half of the screen only)

Symptom: Vertical Black Bar

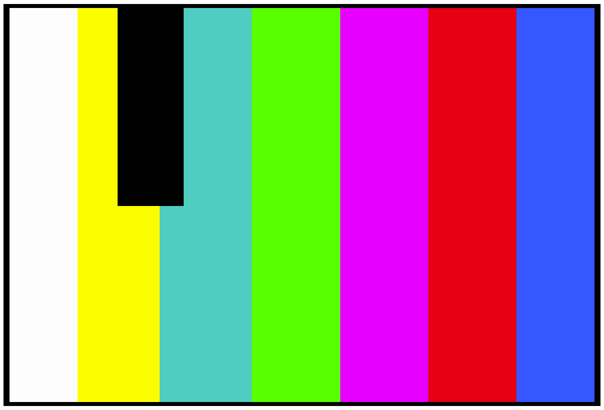


Figure 42

- **Suggestion:** Since the C2 board contains the serial to parallel converters for the picture data that drive this portion of the screen; the most likely cause for this defect can be localized to the C2-Board or the D2-Board.

- **Symptom:** Vertical Black Bar

Suggestion: Since the C3 board contains the serial to parallel converters for the picture data that drive this portion of the screen; the most likely cause for this defect can be localized to the C3-Board or the D2-Board.

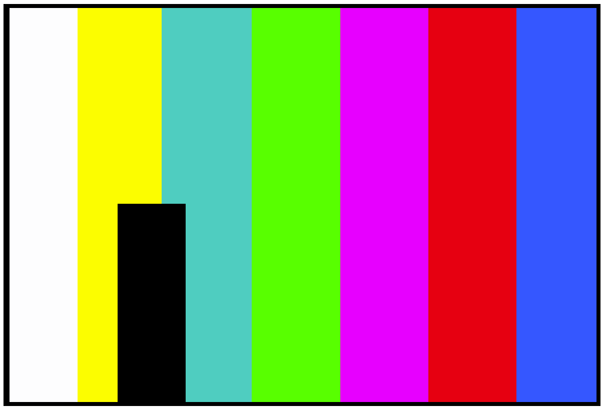


Figure 43

Symptom: No OSD but it has video.

- **Suggestion:** Check signal on the D1 board.

- **Symptom:** Burned image (pattern) is visible.

Suggestion: Activate the scroll bar or run the set with a white raster for at least fifteen minutes.



Figure 44

After Image Prevention

If a customer has been viewing a 4:3 picture or another stationary pattern for a long period of time it is possible for an after image to be burned into the panel. Advise the customer that operation in 4:3 mode for a long period can cause a permanent image burn, damaging the panel. Use of Just mode or Full mode is recommended if the input video source is 4:3 aspect ratio. Pressing the Aspect button on the remote control selects Just or Full mode.

Screen Saver Feature

The Screensaver feature may repair after image damage.

1. Press the Setup button on the remote control.



Figure 45

2. Use the Up/Down arrow buttons on the remote to highlight screensaver, then press the center button.

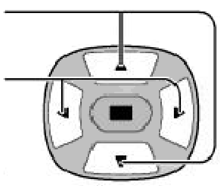


Figure 46

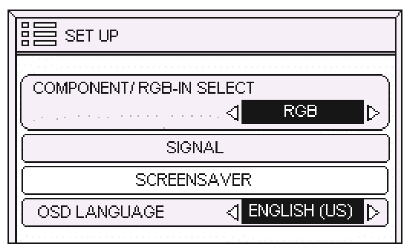


Figure 47

Use the Up/Down arrow buttons to highlight the function. Use the Left/Right Arrow buttons to change the setting.

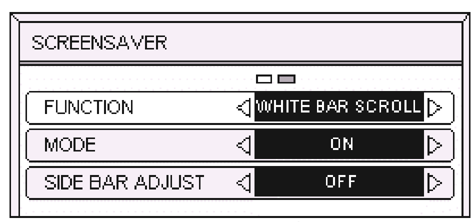


Figure 48

Negative causes the image to invert, white areas become dark and vice versa. White bar scroll causes a white bar to appear and scroll across the screen continuously. Select White bar scroll, then use the arrow down button and then change the mode to ON.

3. Once the mode is ON the menu will disappear and the scrolling bar will appear. Let the Scrolling bar screensaver run for at least 15 minutes if you are attempting to remove an after image problem.

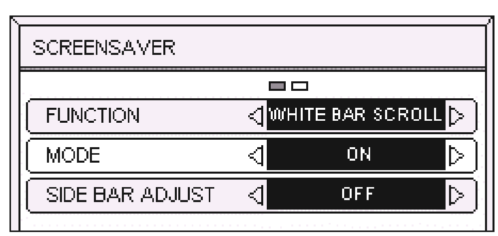


Figure 49

4. To stop the screen saver, press the R button on the remote control.

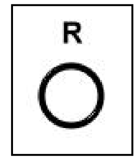


Figure 50

Side Bar Brightness adjustment
This feature allows the customer to adjust the brightness of the non-picture area on either side of the 4:3 image on screen.

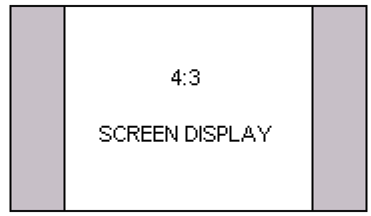


Figure 51

1. Press the Setup button on the remote control.



Figure 52

2. Use the Up/Down arrow buttons to highlight Side bar adjust, then press the action button.

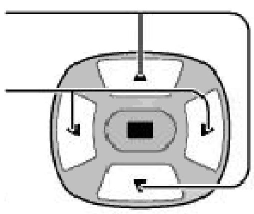


Figure 54

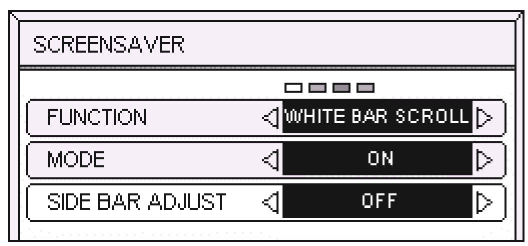


Figure 53

3. Use the Left/Right Arrow buttons to select the desired setting, Off → Dark → Mid → Bright.

Note: Setting the side bar to Bright may cause a flashing effect depending on the image being displayed. Also Bright sidebars may cause an after image.

4. Press the R button on the remote control to exit this menu.

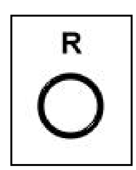


Figure 55

Option Setting
Accessing the Option Menu

1. Press to display the Setup menu.



Figure 56

2. Press to select OSD Language.

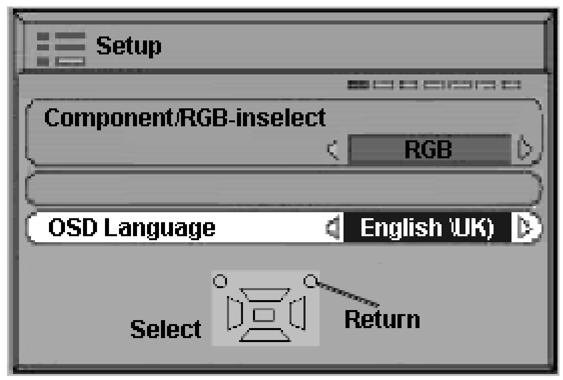


Figure 57

3. Press the surround button on remote control for more than three seconds. The action menu should be displayed on screen.



Figure 58

Settings the Action Menu

1. Use the Up/Down buttons to select the desired item.
2. Use the Left / Right Buttons to select the desired function

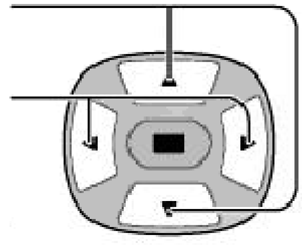


Figure 59

The option menu will disappear 60 seconds after the operation.

Press the R button to exit the Option Menu.

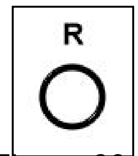


Figure 60

Hidden Option Menu for GPH5D series

GPH5D chassis series have special function and operation setting facility that is called “Option Menu”. This Option Menu is useful for special functions that are required by certain customers. This should be set at the installation stage. The end user could not set or change these because the optional On Screen menu is hidden and accessible via the CAT-mode only.

Option menus	Default setting	Contents
Wobbling	Off	Wobbling operation On/Off. The outline of burnt image will be blurred by intermittent image shift.
Off-timer function	Enable	Off-timer operation Enable/Disable.
On Screen display	Off	Enable/Disable to display input mode indication after power on and no signal indication.
Input Initial	Off	Sets the initial input mode when the power is turned on. Allow input mode selection while power is on.
Initial VOL. level		Sets the initial volume level when the power is turned on. Allow Volume control while power is on.
Maximum VOL. Level	Off	Sets the maximum volume to desired level. Volume cannot exceed this level.
INPUT lock	Off	Fixes the input mode to AV, Component/RGB or PC. Cannot change input mode by input selection key.
Button lock	Off	Enable/Disable front operation buttons (Input and/or volume up/down)
Studio W/B	Off	Set warm mode color temperature to 3,200 Kelvin.
Remote control User Level	Off	Remote key invalidation Off: All keys of the remote are valid. User1: The keys that are Valid are: Stand-by (ON/OFF), Input, Status, Surround, Sound mute On/Off, and volume adjustment. User2: The key that is Valid is only the Stand-by (ON/OFF).

Note:
Setting the remote control User Level and Remote ID off.
1. Access service mode (CAT-mode) and press SET UP key on remote.
2. Access the hidden option menu.
3. Change the remote control User Level and/ or Remote ID set to off.

Sample Waveforms

HY/HZ board

The pages that follow contain samples of waveforms that are present when the unit is in good operating condition. Prior to determining that a board should be replaced, it is advisable that these waveforms are checked to help achieve the right conclusion.

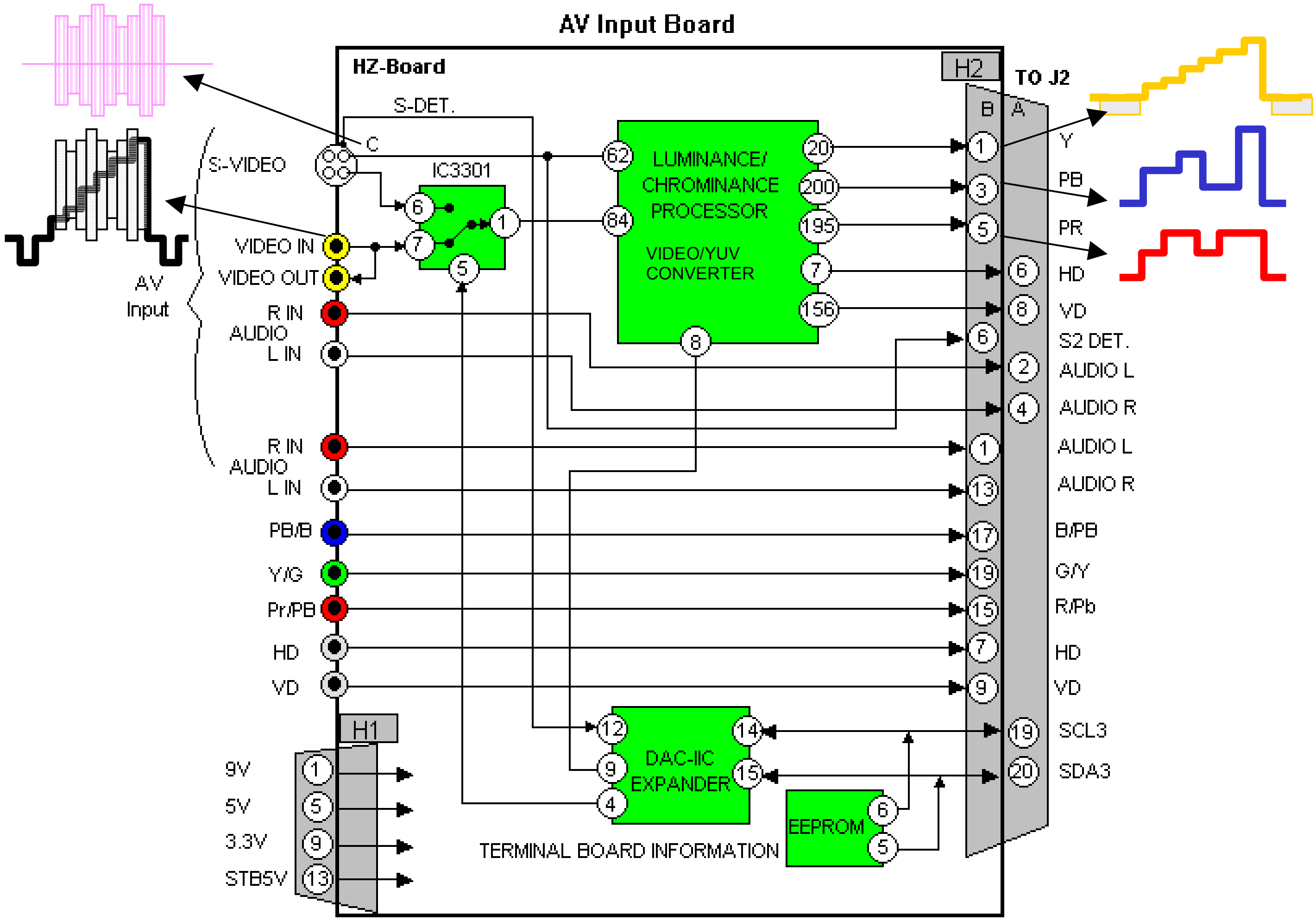
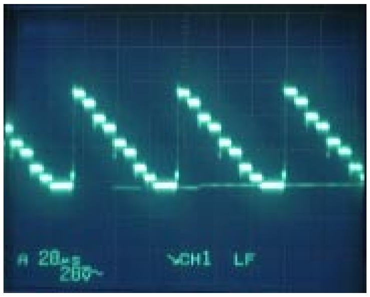


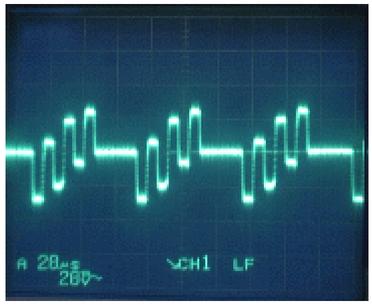
Figure 61

Figure 61 is an illustration of the HZ-Board. The board is the interface between the AV inputs and the D1-Board. When troubleshooting, connect a signal source to the input terminals and observe the output signals at the connector.

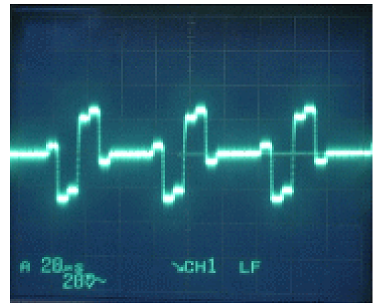
The waveforms listed below must be checked at connector H2 of the HZ-Board.



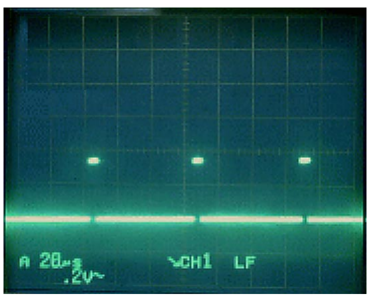
CN H2, Pin B1
20us/div., 20mV
Green Signal Output



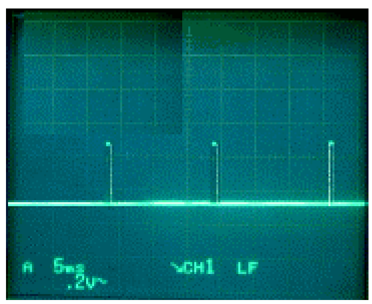
CN H2, Pin B3
20us/div., 20mV
Blue Signal Output



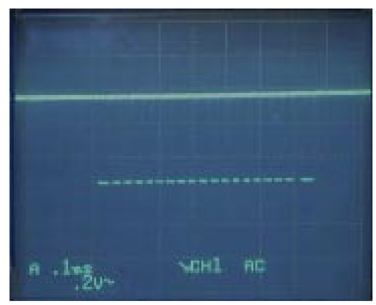
CN H2, Pin B5
20us/div., 20mV
Red Signal Output



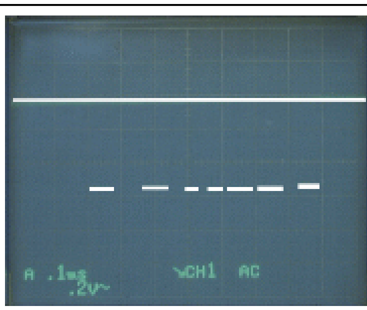
CN H2, Pin A6
20us / div., 0.2V
Horizontal Output



CN H2, Pin A8
5ms /div., 0.2V
Vertical Output



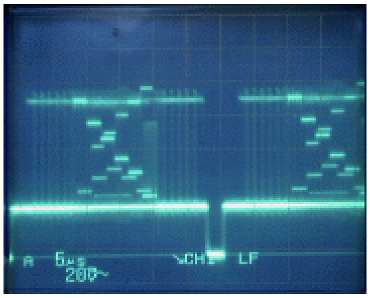
CN H2, Pin A19
0.1ms/ div., 0.2V
SCL3



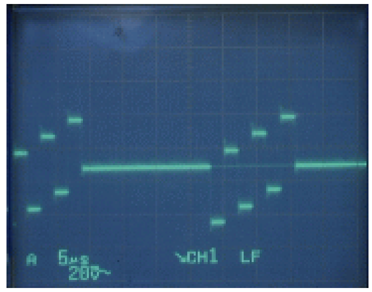
CN H2, Pin A20
0.1ms/div, 0.2V
SDA3

Note: If any of the signals shown here is missing, this indicates a possible malfunction of the HZ-Board. Verify that all DC and I^2C inputs to the HZ-Board are present. If these are correct, replacement of the HZ-Board is recommended.

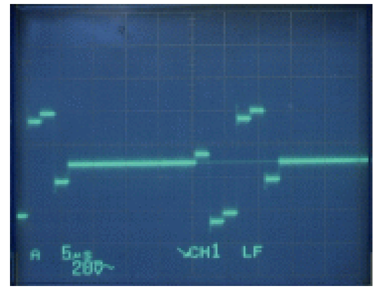
The waveforms listed below must be checked at connector H2 of the HZ-Board.



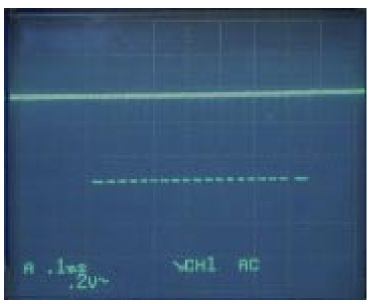
CN H2, Pin B19
5us/div 20mV
Green Signal Input



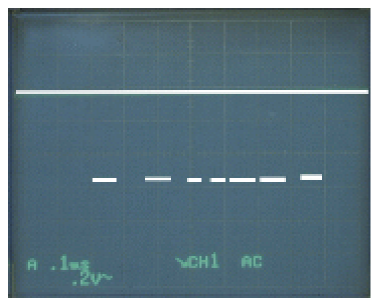
CN H2, Pin B17
5us /div, 20mV
Blue Signal input



CN H2, Pin B15
5us /div, 20mV
Red Signal Input



CN H2, Pin A19
0.1ms/div, 0.2V
SCL3



CN H2, Pin A20
0.1ms/ div, 0.2V
SDA3

Note: A possible malfunction of the HZ-Board may exist if any of the signals listed above is missing. Verify that all DC and I^2C inputs to the HZ-Board are present.
If these are correct, replacement of the HZ-Board is recommended.

HX board

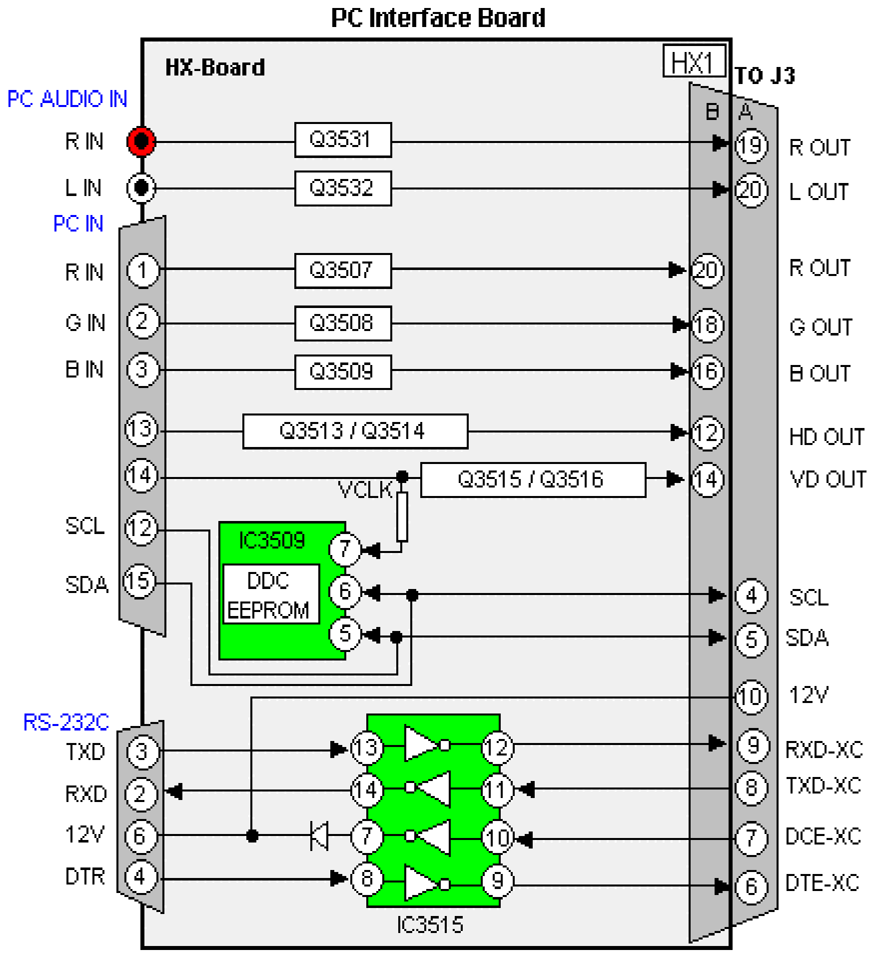
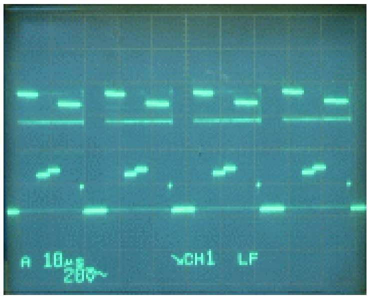


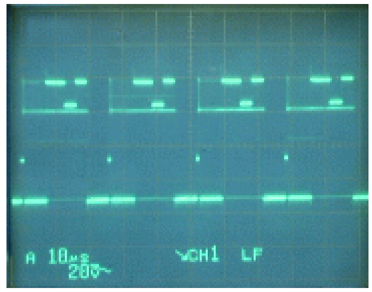
Figure 62

Figure 62 is an illustration of the HX-Board. The board is the interface between the PC input and the D1-Board. When troubleshooting, connect a PC to the input terminals and observe the output signals at connector HX1/D3. See the next page for waveform samples.

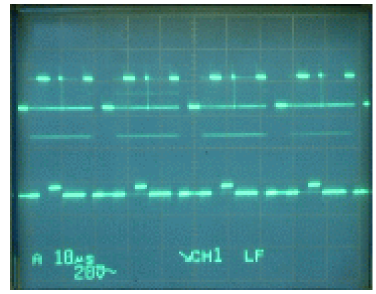
Note: The signals listed below must be checked at connector HX1 of the HX-Board.



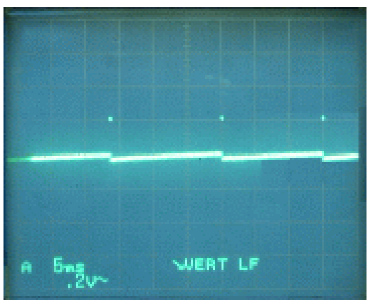
CN HX1, Pin B20
10us / div.20mV
Red Signal Input



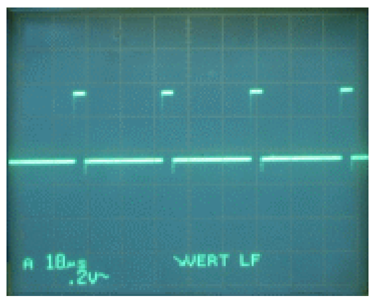
CN HX1, Pin B18
10us_20mV
Green Signal Input



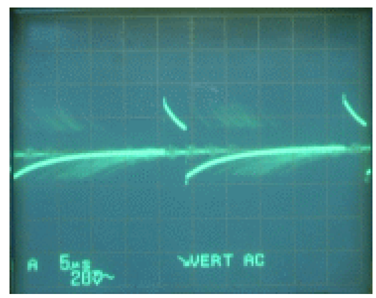
CN HX1, Pin B16
10us/ div, 20mV
Blue Signal Input



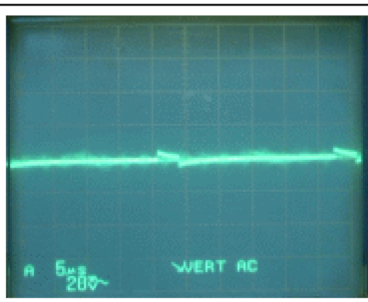
CN HX1, Pin B12
5ms/ div, 0.2V
Vertical Drive



CN HX1, Pin B14
10us/div, 0.2V
Horizontal Drive



CN HX1, Pin A4
5us/ div, 20mV
Serial Data



CN HX1, Pin B4
5ms/ div, 0.2V
Serial Clock

Note: A possible malfunction of the HX-Board may exist if any of the signals listed on this page is missing. Verify that all DC inputs to the HX-Board are present. If these are correct, replacement of the HX-Board is recommended.

SC Board Input Signals

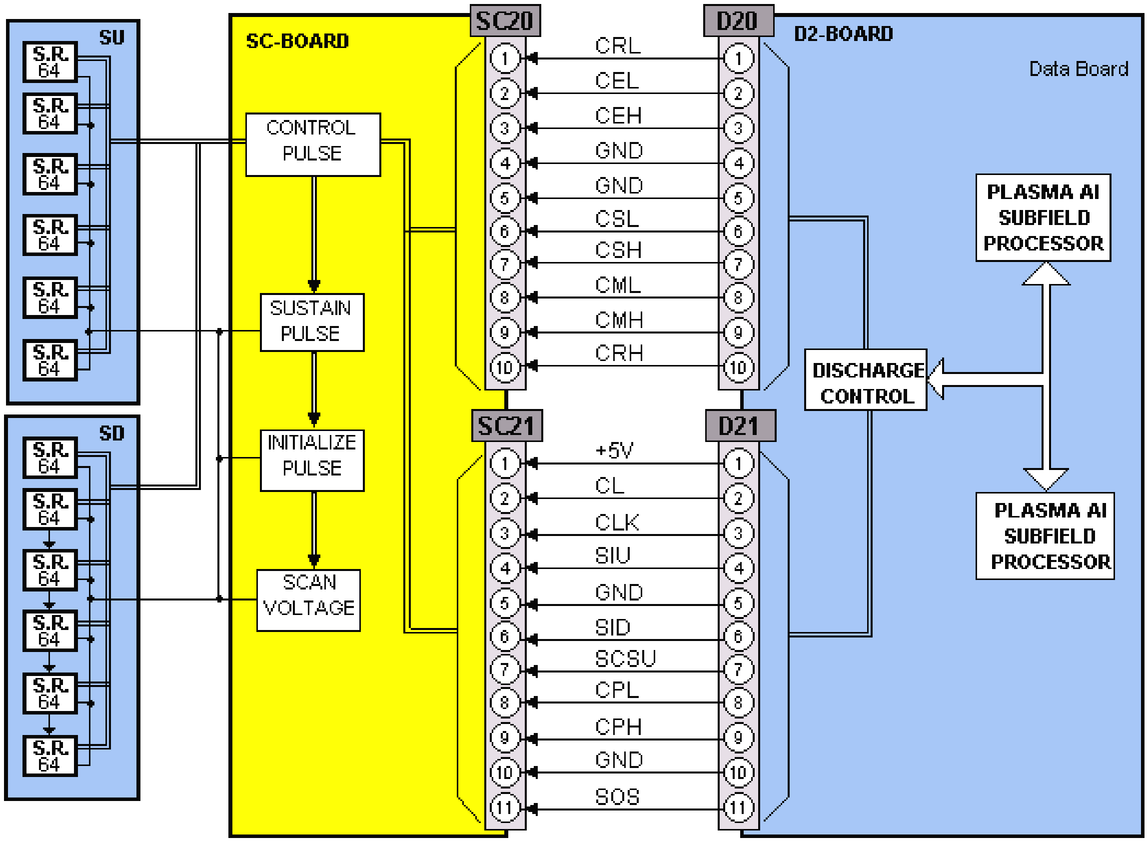
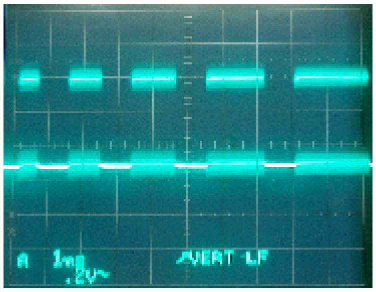


Figure 63

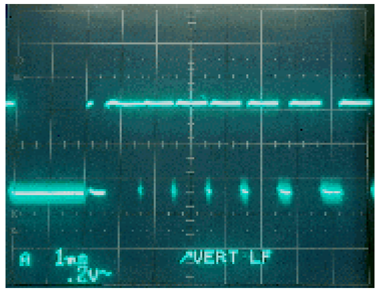
Figure 63 is an illustration of the SC-Board connection to the remaining boards of the panel. The SC-board is the interface between the D2-Board, SU and the SD Boards. When troubleshooting, connect a fixed video source to any of the input terminals and observe the input signals at connector SS20 and SS21. See the next two pages for waveform samples.

SC Board Waveforms

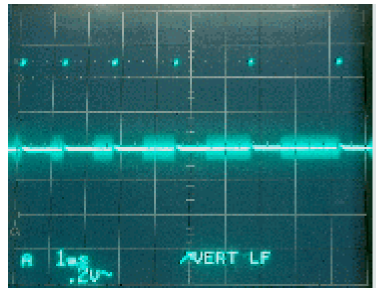
The waveforms listed below must be checked at connector SC20 of the SC-Board.



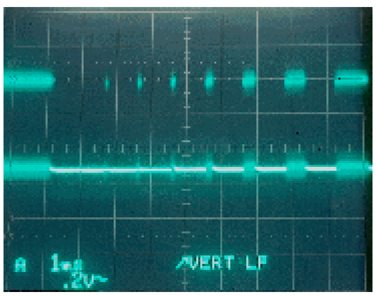
CN SC20, Pin 1
1ms / div, 0.2V
CRL



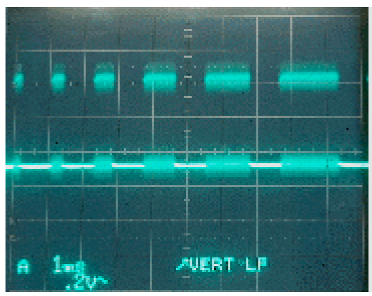
CN SC20, Pin 2
1ms / div, 0.2V
CEL



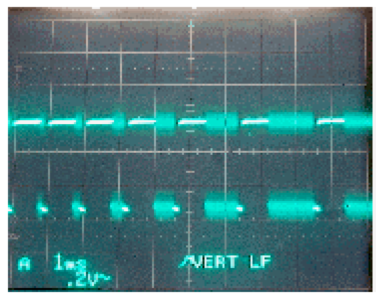
CN SC20, Pin 3
1ms / div, 0.2V
CEH



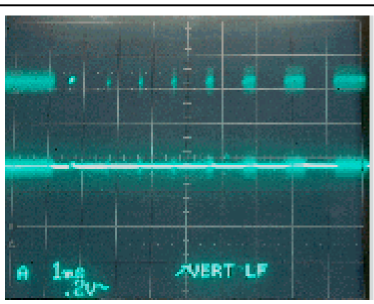
CN SC20, Pin 6
1ms / div, 0.2V
CSL



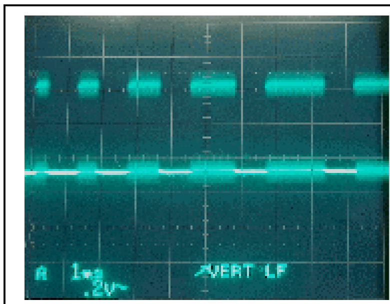
CN SC20, Pin 7
1ms / div, 0.2V
CSH



CN SC20, Pin 8
1ms / div, 0.2V
CML

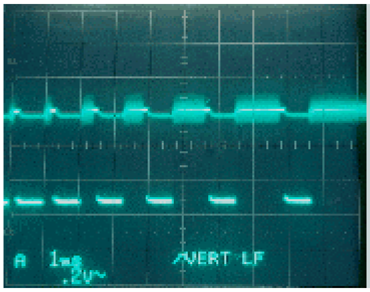


CN SC20, Pin 9
1ms / div, 0.2V
CMH

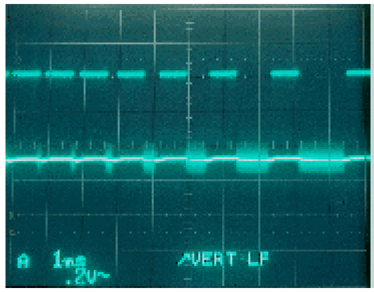


CN SC20, Pin 10
1ms / div, 0.2V
CRH

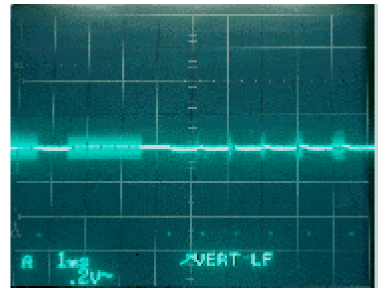
The waveforms listed below must be checked at connector SC21 of the SC-Board.



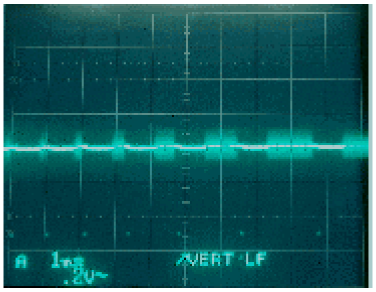
CN SC21, Pin 2
1ms / div, 0.2V
CL



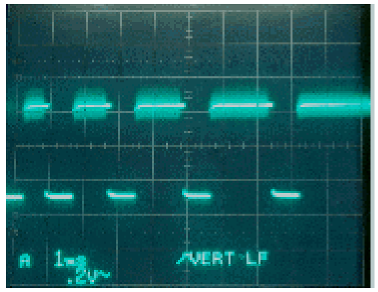
CN SC21, Pin 3
1ms / div, 0.2V
CLK



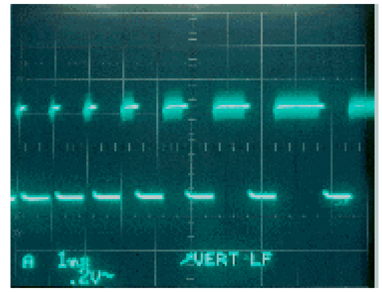
CN SC21, Pin 4
1ms / div, 0.2V
SIU



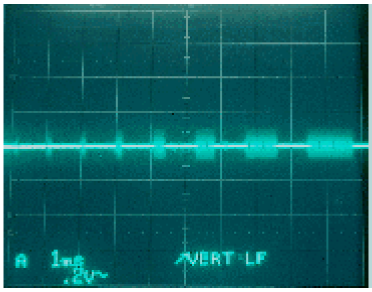
CN SC21, Pin 6
1ms / div, 0.2V
SID



CN SC21, Pin 7
1ms / div, 0.2V
SCSU



CN SC21, Pin 8
1ms / div, 0.2V
CPL



CN SC21, Pin 9
1ms / div, 0.2V
CPH

SS-Board Input Signals

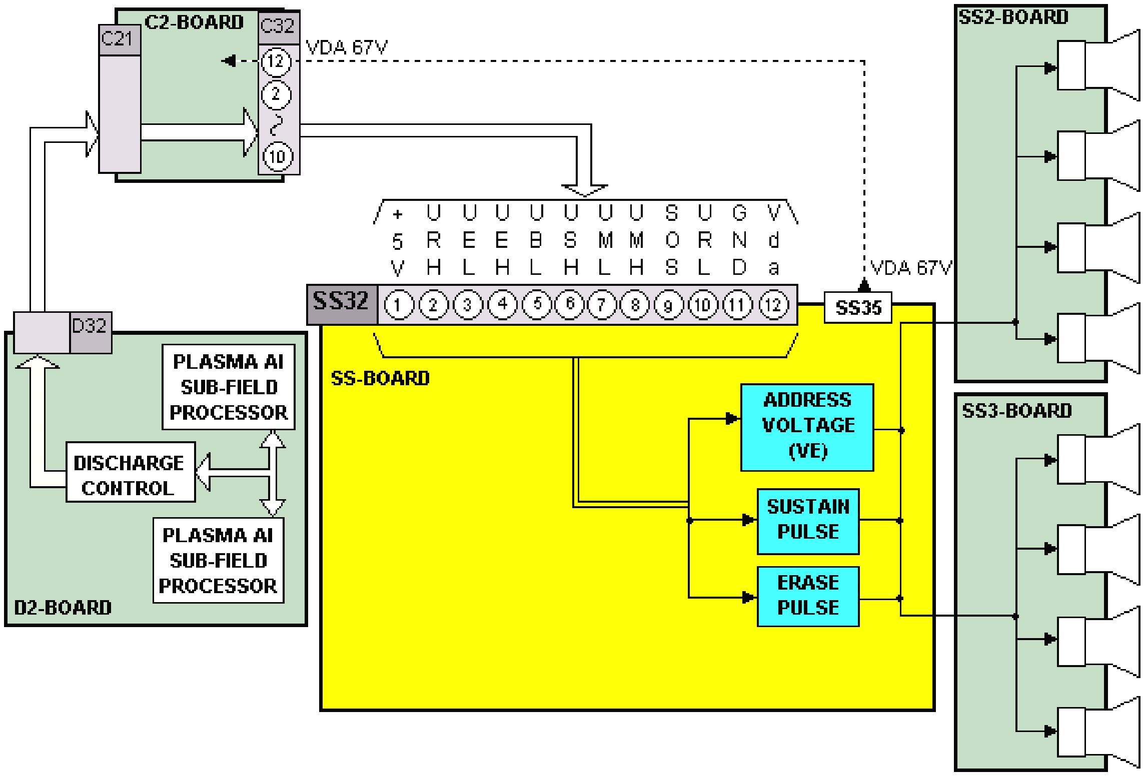
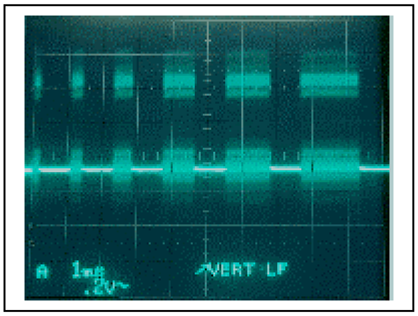


Figure 64

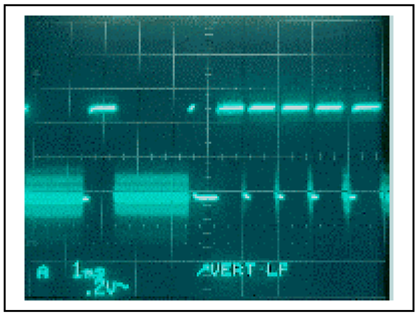
Figure 64 is an illustration of the SS-Board connection to the remaining boards of the panel. The SS-board is the interface between the D2-Board, SS2 and the SS3 Boards. When troubleshooting, connect a fixed video source to any of the input terminals and observe the input signals at connector SS32. See the next page for waveform samples.

SS Board Waveforms

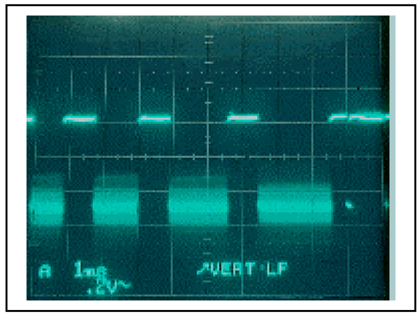
The waveforms listed below must be checked at connector SS32 of the SS-Board.



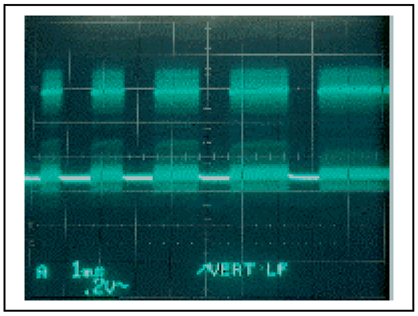
CN SS32, Pin 2
1ms / div, 0.2V
URH



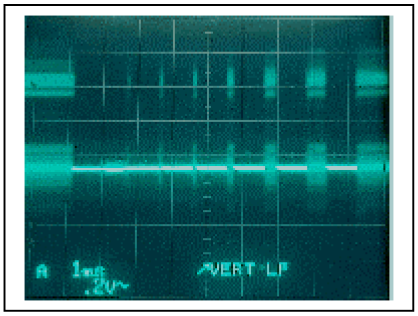
CN SS32, Pin 3
1ms / div, 0.2V
UEL



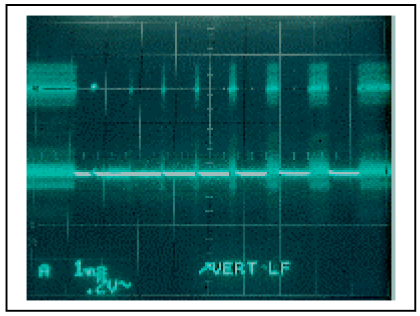
CN SS32, Pin 4
1ms / div, 0.2V
UEH



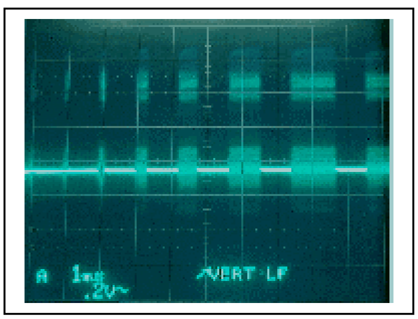
CN SS32, Pin 5
1ms / div, 0.2V
UBL



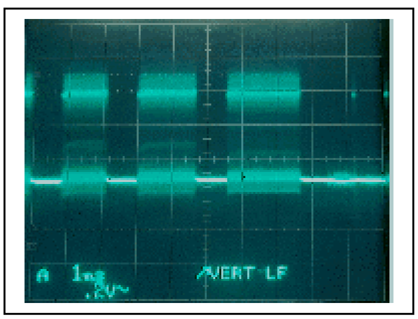
CN SS32, Pin 6
1ms / div, 0.2V
USH



CN SS32, Pin 7
1ms / div, 0.2V
UML



CN SS32, Pin 8
1ms / div, 0.2V
UMH



CN SS32, Pin 10
1ms / div, 0.2V
URL

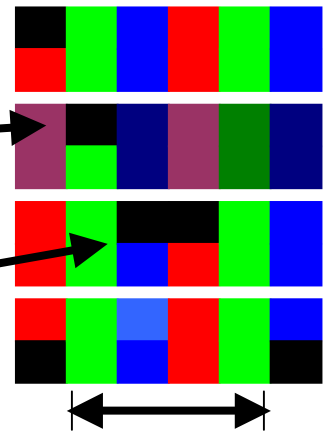
PDP Defect Pixel Specification

1. Dead Pixel (pixel is always off)

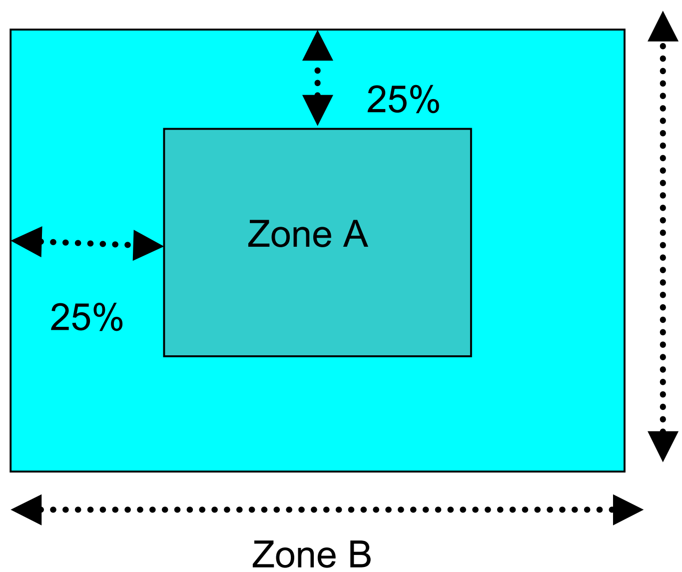
2. Lit Pixel (pixel is always

3. Pair defect (Adjacent pixels

4. Defects Distance (Distance between nearest two defective pixels)



Check Zone



Specification

Zone		Lit Pixel	Dead Pixel		
			Single Defect	Pair Defect	Defect Distance
A	G	0	0	0	-
	R		3		
	B				
B	G	0	6	0	5 cm
	R				
	B				

Connector Tables

F-BOARD CONNECTORS

The following table lists the voltage levels present at each pin of the connectors of the F-Board. Use this information to confirm that the F-Board is operating properly.

Connector F1 Pin Numbers	Signal Name	Voltage Findings
1	AC IN	AC Line Input Level
2	NC	
3	NC	
4	NC	
5	AC IN	AC Line input Level

Connector F9 Pin Numbers	Signal Name	Voltage Findings
1	AC OUT	AC Line input Level
2	NC	
3	NC	
4	NC	
5	AC OUT	AC Line input Level

P-BOARD CONNECTORS

The following table lists the voltage levels present at each pin of the connectors of the P1-Board. Use this information to confirm that the P1-Board is operating properly.

Connector P1/SS1 Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	NC	P1---→SS1 (SS-BOARD)
2	VSUS	P1---→SS1 (SS-BOARD)
3	VSUS	P1---→SS1 (SS-BOARD)
4	NC	P1---→SS1 (SS-BOARD)
5	GNDa	P1---→SS1 (SS-BOARD)
6	GNDa	P1---→SS1 (SS-BOARD)
7	GNDa	P1---→SS1 (SS-BOARD)

Connector P2/SC2 Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	VSUS	P2---→SC2 (SC-BOARD)
2	VSUS	P2---→SC2 (SC-BOARD)
3	NC	P2---→SC2 (SC-BOARD)
4	GNDa	P2---→SC2 (SC-BOARD)
5	GNDa	P2---→SC2 (SC-BOARD)
6	GNDa	P2---→SC2 (SC-BOARD)

P-BOARD CONNECTORS (Continued)

Connector P3/SS3 Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	VDA	P3---→SS3 (SS-BOARD)
2	VDA	P3---→SS3 (SS-BOARD)
3	NC	P3---→SS3 (SS-BOARD)
4	+17V	P3---→SS3 (SS-BOARD)
5	GNDa	P3---→SS3 (SS-BOARD)
6	GNDa	P3---→SS3 (SS-BOARD)
7	GNDa	P3---→SS3 (SS-BOARD)
8	GND	P3---→SS3 (SS-BOARD)
9	NC	P3---→SS3 (SS-BOARD)
10	STB PS	P3---→SS3 (SS-BOARD)

Connector P4/SC4 Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	+17V	P4---→SC4 (SC-BOARD)
2	+17V	P4---→SC4 (SC-BOARD)
3	GNDa	P4---→SC4 (SC-BOARD)

Connector P5/D25 Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	13.5V	P5---→D25 (D2-BOARD)
2	13.5V	P5---→D25 (D2-BOARD)
3	GND	P5---→D25 (D2-BOARD)
4	GND	P5---→D25 (D2-BOARD)
5	+5.2V	P5---→D25 (D2-BOARD)
6	GND	P5---→D25 (D2-BOARD)
7	FAN CONT	P5---→D25 (D2-BOARD)
8	GND	P5---→D25 (D2-BOARD)

Connector P6/Z6 Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	+13.5V	P6---→Z6 (Z-BOARD)
2	GNDs	P6---→Z6 (Z-BOARD)
3	-13.5V	P6---→Z6 (Z-BOARD)
4	NC	P6---→Z6 (Z-BOARD)
5	GNDs	P6---→Z6 (Z-BOARD)
6	+5.2V	P6---→Z6 (Z-BOARD)
7	GNDs	P6---→Z6 (Z-BOARD)

Connector P7/D27 Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	RUSH ON/OFF	P7---→D27 (D2-BOARD)
2	TV ON/OFF	P7---→D27 (D2-BOARD)
3	GND	P7---→D27 (D2-BOARD)
4	STB5V	P7---→D27 (D2-BOARD)
5	KILLSOS	P7---→D27 (D2-BOARD)
6	FAN SOS	P7---→D27
7	PS SOS	P7---→D27 (D2-BOARD)
8	ALL OFF1	P7---→D27 (D2-BOARD)
9	GND	P7---→D27 (D2-BOARD)

Connector P10/FAN Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	FAN +12V	P10---→FAN
2	GND	P10---→FAN
3	FAN SOS	P10---→FAN

Connector P11/FAN Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	FAN +12V	P11---→FAN
2	GND	P11---→FAN
3	FAN SOS	P11---→FAN

Connector P12/FAN Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	FAN +12V	P12---→FAN
2	GND	P12---→FAN
3	FAN SOS	P12---→FAN

Connector P13/FAN Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	FAN +12V	P13---→FAN
2	GND	P13---→FAN
3	FAN SOS	P13---→FAN

Connector P15/P15A Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	H. OUT	P15---→P15A (P3-BOARD)
2	H. OUT GND	P15---→P15A (P3-BOARD)
3	H. VCC	P15---→P15A (P3-BOARD)
4	NC	P15---→P15A (P3-BOARD)
5	NC	P15---→P15A (P3-BOARD)
6	L. OUT	P15---→P15A (P3-BOARD)
7	L. DRIVE. GND	P15---→P15A (P3-BOARD)
8	L. CNT. GND	P15---→P15A (P3-BOARD)
9	I. SENSE. GND	P15---→P15A (P3-BOARD)
10	I. SENSE	P15---→P15A (P3-BOARD)
11	NC	P15---→P15A (P3-BOARD)
12	18V	P15---→P15A (P3-BOARD)
13	SOS OUT	P15---→P15A (P3-BOARD)

Connector P16/P16A Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	SOS	P16---→P16A (P3-BOARD)
2	+17V	P16---→P16A (P3-BOARD)
3	GNDa	P16---→P16A (P3-BOARD)
4	GNDa	P16---→P16A (P3-BOARD)
5	NC	P16---→P16A (P3-BOARD)
6	VSUS OVP	P16---→P16A (P3-BOARD)
7	NC	P16---→P16A (P3-BOARD)
8	VSUS	P16---→P16A (P3-BOARD)

P-BOARD CONNECTORS (Continued)

Connector P18/P18A Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	STOP	P18---→P18A (P1-BOARD)
2	VCC	P18---→P18A (P1-BOARD)
3	START	P18---→P18A (P1-BOARD)
4	NC	P18---→P18A (P1-BOARD)
5	GATE	P18---→P18A (P1-BOARD)
6	NC	P18---→P18A (P1-BOARD)
7	H. GND	P18---→P18A (P1-BOARD)
8	NC	P18---→P18A (P1-BOARD)
9	C.L.M.	P18---→P18A (P1-BOARD)
10	F.B	P18---→P18A (P1-BOARD)

Connector P19/P19A Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	START	P19---→P19A (P6-BOARD)
2	VCC	P19---→P19A (P6-BOARD)
3	BACK UP	P19---→P19A (P6-BOARD)
4	GATE	P19---→P19A (P6-BOARD)
5	MULTI	P19---→P19A (P6-BOARD)
6	H. DRIVE. GND	P19---→P19A (P6-BOARD)
7	H. SIGNAL. GND	P19---→P19A (P6-BOARD)
8	VRMS	P19---→P19A (P6-BOARD)
9	IAC	P19---→P19A (P6-BOARD)
10	TV ON	P19---→P19A (P6-BOARD)
11	F.B	P19---→P19A (P6-BOARD)
12	OVP/SOS IN	P19---→P19A (P6-BOARD)

Connector P22/P22A Pin Numbers	Signal Name	Signal Flow (Board or Connector)
1	13.5V	P22---→P22A (P8-BOARD)
2	5.2V	P22---→P22A (P8-BOARD)
3	+13.5Vs	P22---→P22A (P8-BOARD)
4	-13.5Vs	P22---→P22A (P8-BOARD)
5	GNDa	P22---→P22A (P8-BOARD)
6	VCC	P22---→P22A (P8-BOARD)
7	SOS	P22---→P22A (P8-BOARD)
8	GNDa	P22---→P22A (P8-BOARD)

HX- BOARD CONNECTORS

The following table lists the voltage levels present at each pin of the connectors of the HX-Board. Use this information to confirm that the HX-Board is operating properly.

Connector HX1/D3 Pin Number	Signal Name	Voltage Findings	Signal Flow (Board or Connector)
A-1	5V	5.2Vdc	HX1---→D3 (D1-BOARD)
A-2	5V	5.2Vdc	HX1---→D3 (D1-BOARD)
A-3	NC	NC	HX1---→D3 (D1-BOARD)
A-4	SCL	4.4Vdc	HX1---→D3 (D1-BOARD)
A-5	SDA	4.4Vdc	HX1---→D3 (D1-BOARD)
A-6	GND	GND	HX1---→D3 (D1-BOARD)
A-7	NC	NC	HX1---→D3 (D1-BOARD)
A-8	GND	GND	HX1---→D3 (D1-BOARD)
A-9	NC	NC	HX1---→D3 (D1-BOARD)
A-10	GND	GND	HX1---→D3 (D1-BOARD)
A-11	NC	NC	HX1---→D3 (D1-BOARD)
A-12	GND	GND	HX1---→D3 (D1-BOARD)
A-13	NC	NC	HX1---→D3 (D1-BOARD)
A-14	NC	NC	HX1---→D3 (D1-BOARD)
A-15	NC	NC	HX1---→D3 (D1-BOARD)
A-16	NC	NC	HX1---→D3 (D1-BOARD)
A-17	NC	NC	HX1---→D3 (D1-BOARD)
A-18	NC	NC	HX1---→D3 (D1-BOARD)
A-19	PC Rs	5.2Vdc	HX1---→D3 (D1-BOARD)
A-20	PC Ls	5.2Vdc	HX1---→D3 (D1-BOARD)

Connector HX1/D3 Pin Number	Signal Name	Voltage Findings	Signal Flow (Board or Connector)
B-1	STB5V	5Vdc	HX1---→D3 (D1-BOARD)
B-2	STB5V	5Vdc	HX1---→D3 (D1-BOARD)
B-3	9V	9Vdc	HX1---→D3 (D1-BOARD)
B-4	9V	9Vdc	HX1---→D3 (D1-BOARD)
B-5	NC	0Vdc	HX1---→D3 (D1-BOARD)
B-6	DTE-XC	5Vdc	HX1---→D3 (D1-BOARD)
B-7	DCE-XC	0V	HX1---→D3 (D1-BOARD)
B-8	TXD-XC	5Vdc	HX1---→D3 (D1-BOARD)
B-9	RXD-XC	5Vdc	HX1---→D3 (D1-BOARD)
B-10	12V	12.1Vdc	HX1---→D3 (D1-BOARD)
B-11	12V	12Vdc	HX1---→D3 (D1-BOARD)
B-12	PC VD	4.6Vdc	HX1---→D3 (D1-BOARD)
B-13	GND	GND	HX1---→D3 (D1-BOARD)
B-14	PC HD	4.5Vdc	HX1---→D3 (D1-BOARD)
B-15	GND	GND	HX1---→D3 (D1-BOARD)
B-16	PC B	Varying Vdc	HX1---→D3 (D1-BOARD)
B-17	GND	GND	HX1---→D3 (D1-BOARD)
B-18	PC G	Varying Vdc	HX1---→D3 (D1-BOARD)
B-19	GND	GND	HX1---→D3 (D1-BOARD)
B-20	PC R	Varying Vdc	HX1---→D3 (D1-BOARD)

HY / HZ- BOARD CONNECTORS

The following table lists the voltage levels present at each pin of the connectors of the HY or HZ -Board. Use this information to confirm that the HY or HZ-Board is operating properly.

Connector H1/D1 Pin Number	**Signal Name**	**Voltage Findings**	**Signal Flow (Board or Connector)**
A-1	9V	9Vdc	H1---→D1 (D1-BOARD)
A-2	9V	9Vdc	H1---→D1 (D1-BOARD)
A-3	GND	GND	H1---→D1 (D1-BOARD)
A-4	GND	GND	H1---→D1 (D1-BOARD)
A-5	5V	5.2Vdc	H1---→D1 (D1-BOARD)
A-6	5V	5.2Vdc	H1---→D1 (D1-BOARD)
A-7	GND	GND	H1---→D1 (D1-BOARD)
A-8	GND	GND	H1---→D1 (D1-BOARD)
A-9	3.3V	3.46Vdc	H1---→D1 (D1-BOARD)
A-10	3.3V	3.46Vdc	H1---→D1 (D1-BOARD)
A-11	GND	GND	H1---→D1 (D1-BOARD)
A-12	GND	GND	H1---→D1 (D1-BOARD)
A-13	STB5V	5Vdc	H1---→D1 (D1-BOARD)
A-14	STB5V	5Vdc	H1---→D1 (D1-BOARD)
A-15	GND	GND	H1---→D1 (D1-BOARD)
A-16	GND	GND	H1---→D1 (D1-BOARD)
A-17	GND	GND	H1---→D1 (D1-BOARD)
A-18	GND	GND	H1---→D1 (D1-BOARD)
A-19	GND	GND	H1---→D1 (D1-BOARD)
A-20	GND	GND	H1---→D1 (D1-BOARD)
A-21	GND	GND	H1---→D1 (D1-BOARD)
A-22	NC	GND	H1---→D1 (D1-BOARD)
A-23	NC	GND	H1---→D1 (D1-BOARD)
A-24	NC	GND	H1---→D1 (D1-BOARD)
A-25	NC	GND	H1---→D1 (D1-BOARD)

Adjustment Procedures

Panel label Information

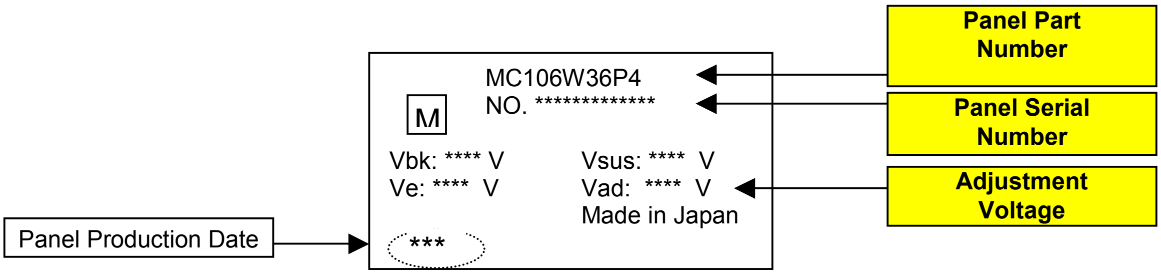
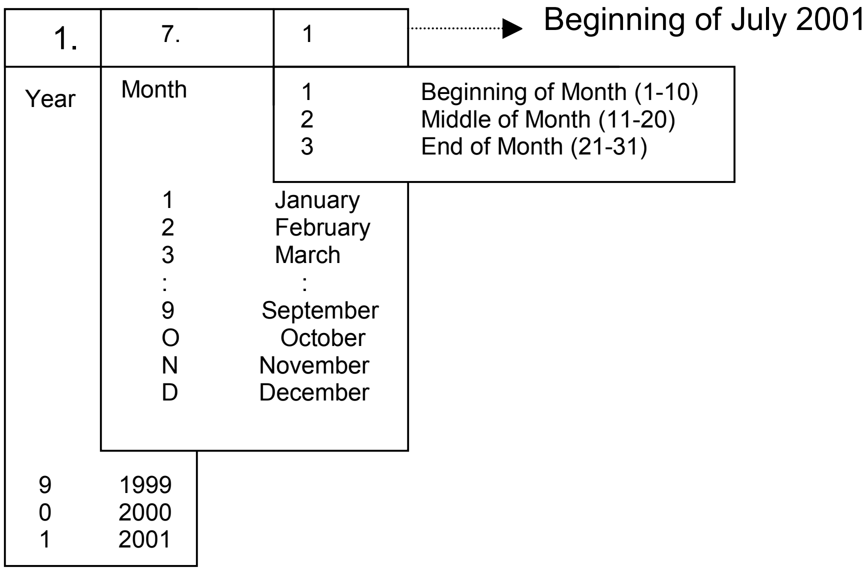


Figure 65

An example of the panel production date:



+B Set-up

Item / Preparation

- Input a 100% white signal.
- Set the picture mode to Normal and the White Balance to Normal

- **Adjustments**

  Adjust and confirm the indicated test point below for the specified voltage.

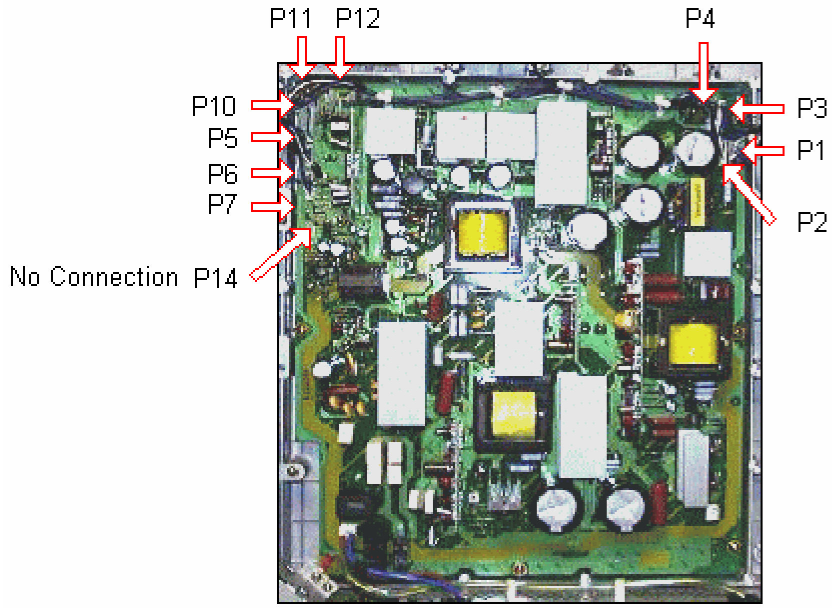


Figure 66

Adjustment table

Name	Test Point	Voltage	Volume
PFC	P20 across pins 1 and 2	400V ± 1V	R548
Vsus	P1 pin 2	175V ± 1V	R625
Vda	P3 pin 1	75.0 ± 0.5V	R545

Confirmation

Name	Test point	Voltage
+18V	P4 pin 1	17.2V ± 0.5V
+13.5V	P5 pin 1	13.2V ± 0.5V
Audio +15V	P6 pin 1	Audio 13.5V ± 0.5V
Audio –15V	P6 pin 3	Audio –13.5V ± 0.5V
5.25V	P5 pin 5	5.1V ± 0.3V
STB5V	P7 pin 4	5.0V ± 0.3V

Driver Set-up

Item / Preparation

- Input an APL 100 % white signal.
- Set the picture mode to Normal and the White Balance to Normal

Adjustments

To perform the following adjustments, please refer to the panel information label located on the heat sink of the panel. See the next page for more information about the panel label.

Name	Test point	Voltage	Volume
Vsus	TPVSUS (SS-BOARD)	Vsus ± 1V*	R625 (P3-BOARD)
Vbk	TPVBK (SC-BOARD)	Vbk ± 5V*	R6670 (SC-BOARD)
Ve	TPVE (SS-BOARD)	Ve ± 1V*	R6770 (SS-BOARD)
Vset	TPVSET (SC-BOARD)	218 V ± 6V	---
Vad	TPVAD (C9-BOARD)	Vad ± 1V*	R6477 (SC-BOARD)
Vda	TPVDA (SS Board)	74V ± 1V	R545 (P1-BOARD)
VSCN	TPVSCN (SC-BOARD)	Vad+118 ± 2V	---

Initialization Pulse Adjust

Item / Preparation

- Input a Crosshatch signal.
- Set the picture mode to Normal and the White Balance to Normal

Adjustments

Adjust the indicated test point for the specified waveform. Use TPSS1 as the trigger source.

	Test point	Volume	Level
T1	TPSC1 (SC)	R6523 (SC-Board)	≠ 0
T2	TPSC1 (SC)	R6557 (SC-Board)	170 ±20μ Sec

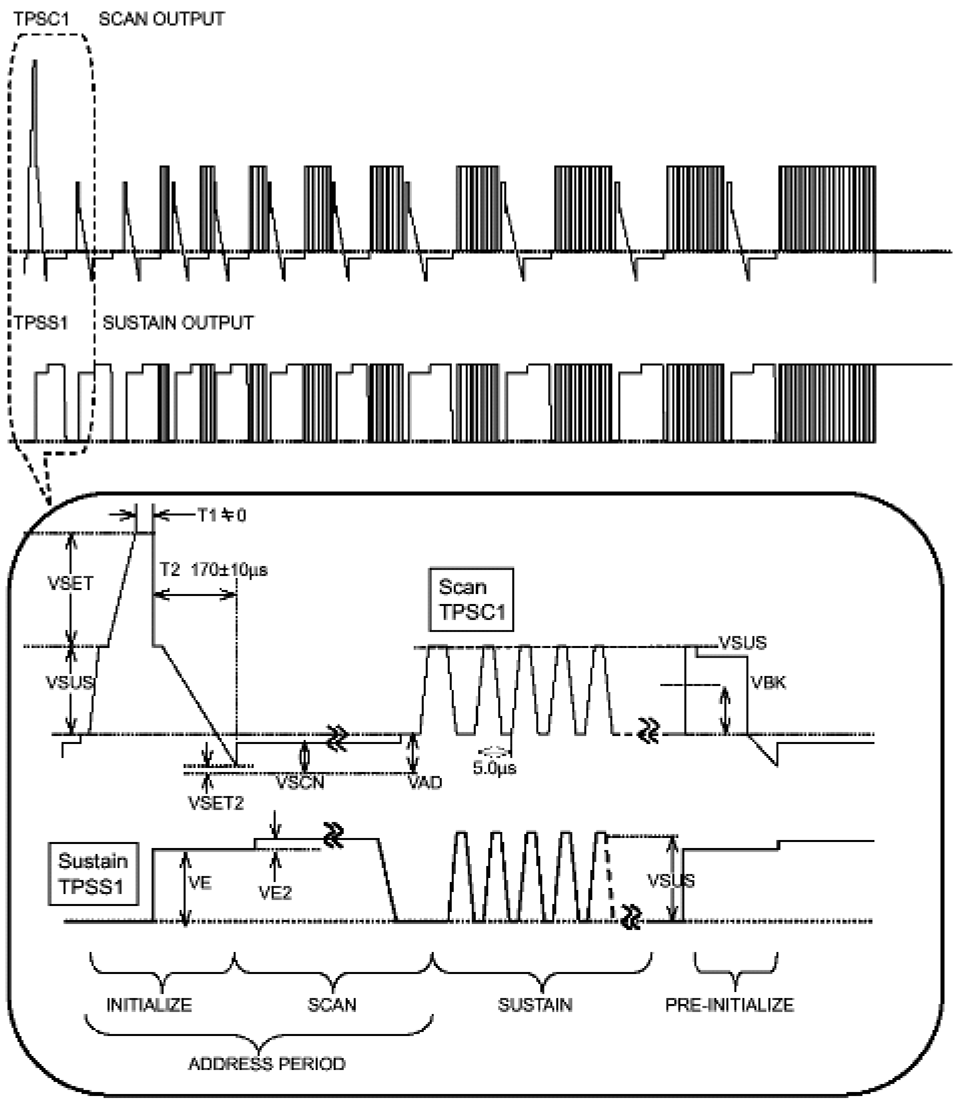


Figure 67

P.C.B. (Printed Circuit Board) exchange procedure

1. Caution

Wait 1 minute for the electrolytic capacitors to discharge before removing any PCB from the unit.

2. Quick adjustment after P.C.B. exchange

P.C.B.	Item	Volume	Test point	Level
P Board	PFC	R548 (P3)	P20 connector pins 1 and 2	400V ± 1V
	Vsus	R625 (P3)	TPVsus (SS)	Vsus ± 1V*
	Vda	R545 (P1)	TPVDA (SS Board)	74V ± 1V
SC Board	Vad	R6477 (SC)	TPVAD (SC)	Vad ± 1V*
	Vbk	R6670 (SC)	TPVBK (SC)	Vbk ± 5V*
SS Board	Ve	R6770 (SS)	TPVE (SS)	Ve ± 1V*
D1, D2 Board	White Balance and Sub brightness for NTSC, 480p, 720p and 1080i signals			

*Refer to the Panel label for the exact value.

Adjustment Volume Locations

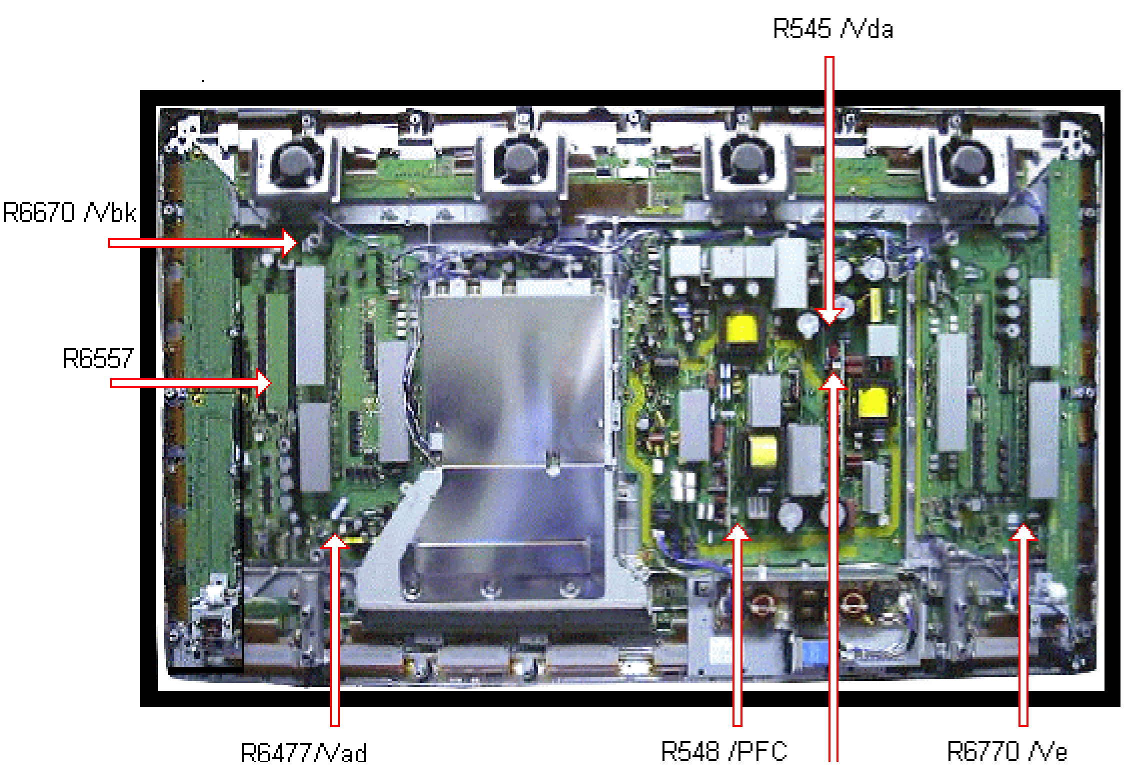


Figure 68

Test Point locations

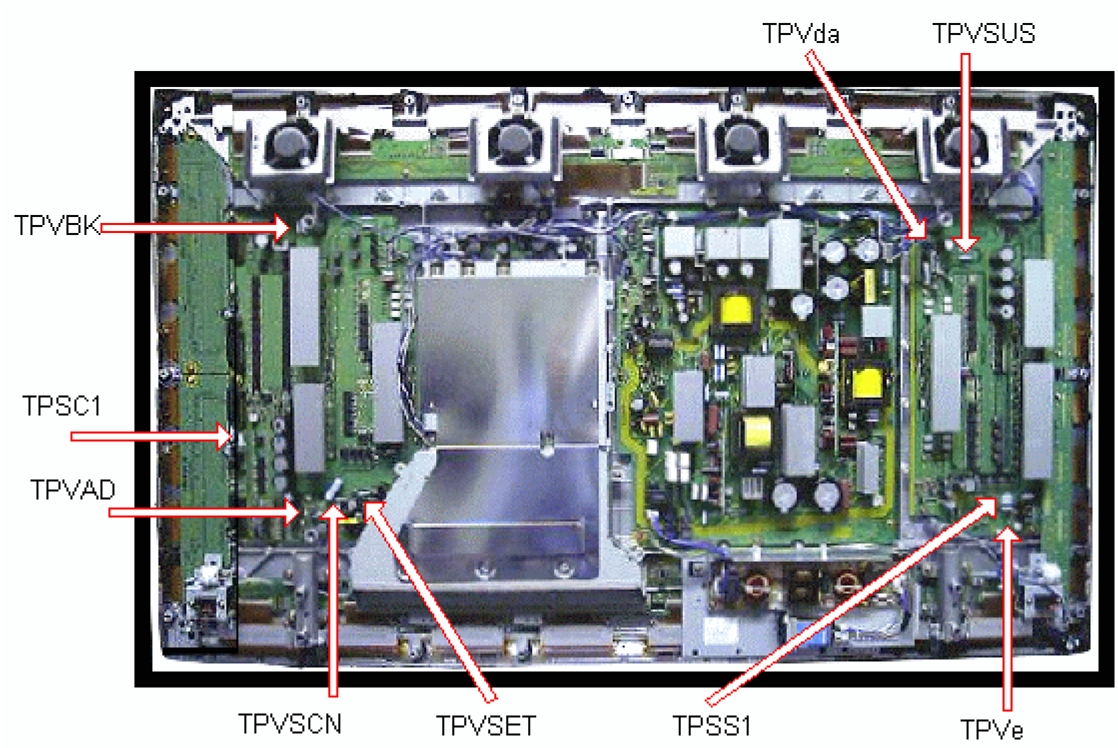
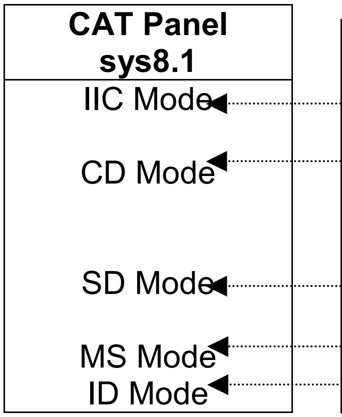


Figure 69

Serviceman mode

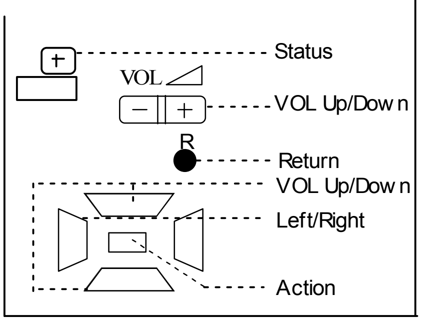
CAT (computer aided test) Mode

CAT mode menu



Mode	Function	Access Button
IIC	Service Alignment	Action
CD (Complete Diagnostics)	Software Version Information EEPROM Edit	Mute More than 5 seconds
SD (Status Display)	MTBF Parameter	Action
MS Mode	Not used	------
ID	Not used	------

<u>Remote Control</u>



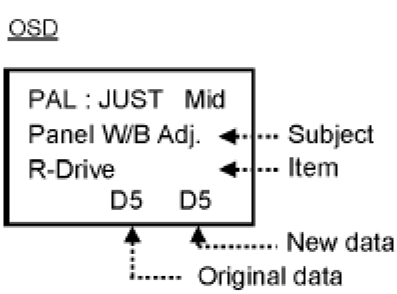
How to access the CAT mode.

Press and hold the **Volume/Down button** on the front panel of the unit and press the **status button** on the remote control three times within one second, this will place the unit into the CAT Mode.

To exit the **CAT** mode, access the **ID mode** and switch off the main power.

I^{2}C Mode

Select the I^{2}C mode by pressing the **Up/Down button** on the remote control from the front page of the CAT menu, and then press the **Action button** on the remote control.



<u>How to use the I^{2}C mode?</u>

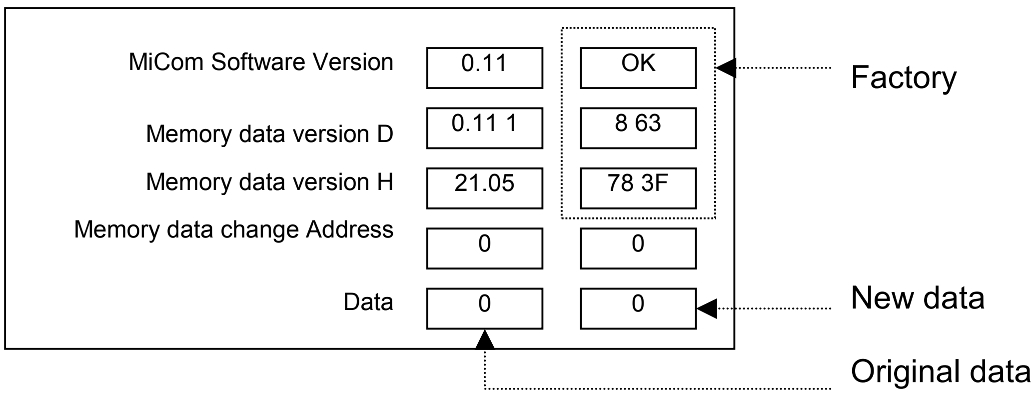
1. Select the alignment subject by pressing **the UP/Down buttons** on the remote control.
2. Select the alignment item by pressing the **Left and Right buttons** on the remote control.
3. Adjust the optimum setting by pressing **the Volume Up/Down buttons** on the remote control.
4. The data is memorized when the **R button** is pressed on the remote control or the alignment Subject (or item) is changed.

To exit the I^{2}C mode, press the **R button** on the remote control.

CD mode

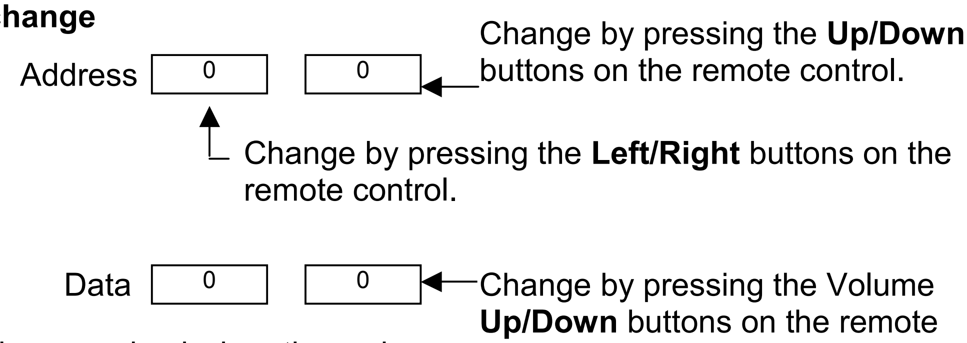
Select the CD mode from the front page of the CAT menu by pressing the **Up/Down** button on the remote control, and then press the **Mute** button on the remote control for more than 5 sec.

OSD



The software version of the EEPROM (IC9354) can be upgraded by:
1. Installing a new version IC
2. Loading the new version software from the loader tool, TZSC07036

Memory data change



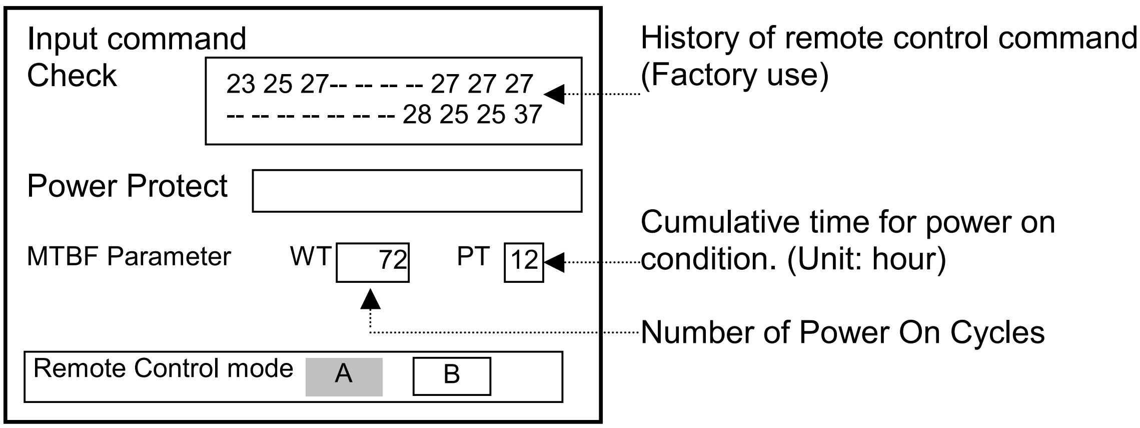
Note: The data is memorized when the main power switch is pushed to the off position.

To exit the CD mode, press the R button **on the remote control.**

SD Mode

Select the SD mode from the front page of the CAT mode by pressing the **Up/Down** button on the remote control, and then press the **Action** button on the remote control.

OSD



To exit the SD mode, press the **R** button on the remote control.

I²C Menu Structure

The values indicated in this flowchart are sampled data.

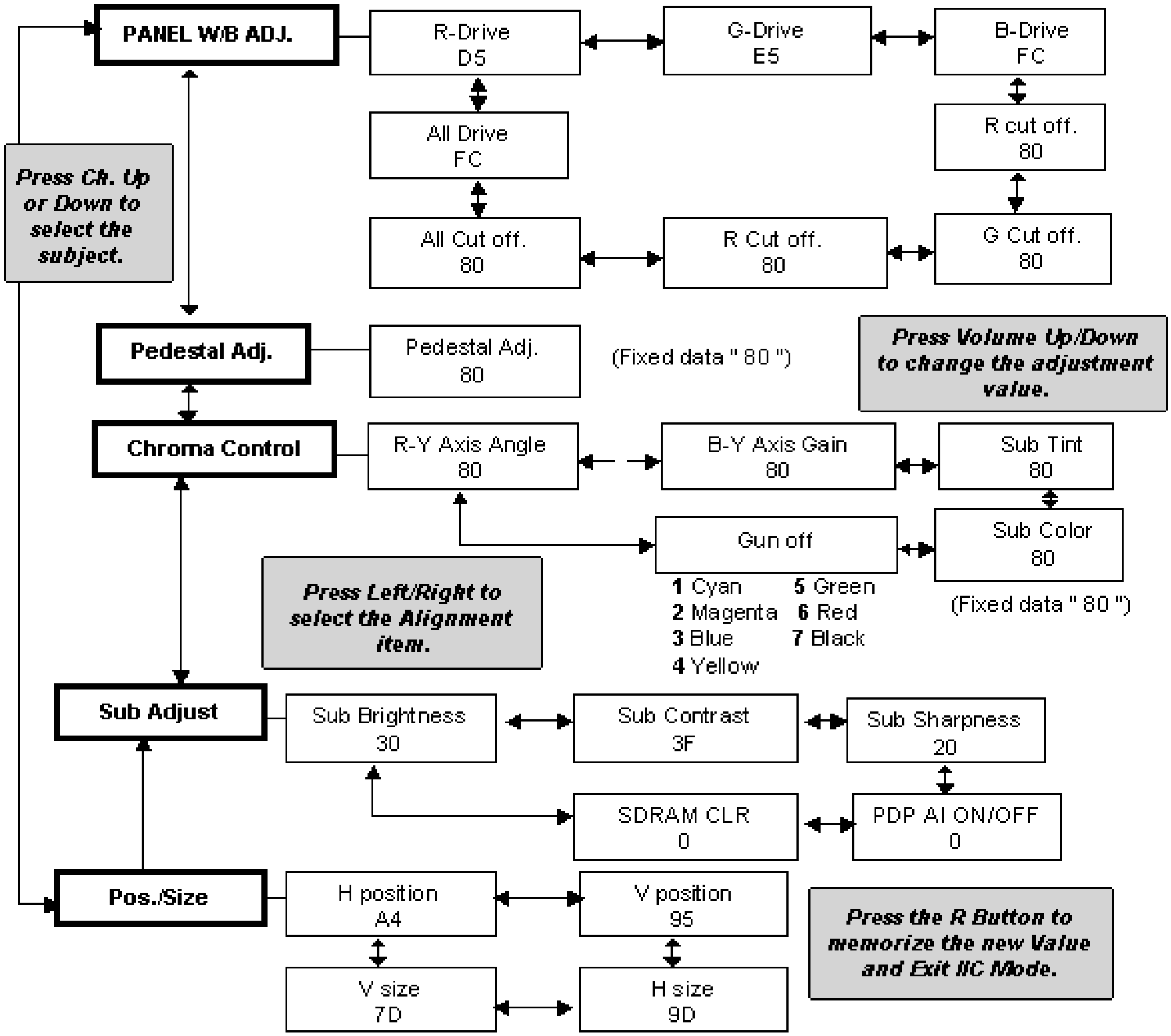


Figure 70

Alignment Procedures

Pedestal Setting

Equipment required: HDTV Component Video Gray scale pattern Generator, PC Video Gray Scale Generator
Panel Settings; Picture = Normal, White Balance = Cool, Aspect Ratio = 16:9

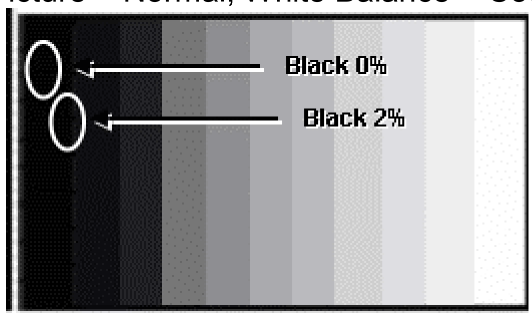
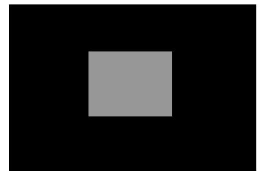
Pattern Display: 

Figure 71

Step 1- Access the R, G and B cutoff settings and set them to “80”.
Step 2- Under the Chroma Control setting, Set Gun off to **"**5" (Only green pixels emitting).
Step 3- Access the RGB Sub Adjust, G Sub Bright setting and adjust G Sub bright so that green pixel emission starts at black 2% area and no emission occurs in the black 0% area.
Step 4- Under the Chroma Control setting, Set Gun off to **"**3". (Only blue pixels emitting.)
Step 5- Access the RGB Sub Adjust, B Sub Bright setting and adjust B Sub bright so that blue pixel emission starts at black 2% area and no emission occurs in the black 0% area.
Step 6- Under the Chroma Control setting, Set Gun off to **"**6". (Only red pixels emitting.)
Step 7- Access the RGB Sub Adjust, R Sub Bright setting and adjust R Sub bright so that Red pixel emission starts at black 2% area and no emission occurs in the black 0% area.
Step 8- Change input to PC / RGB signal. Repeat procedure (1 to 7) using PC input signal.

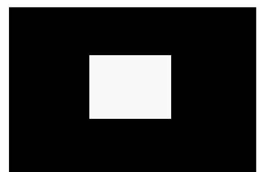
NTSC (480i) White Balance Adjustment

Equipment required: NTSC Pattern Generator, Colorimeter
Panel Settings; Picture = Standard, Color Temperature = Cool, Aspect Ratio = 16:9



20 IRE Window pattern

Step 1- Using the Pattern generator; apply a 20 IRE (15% Light) Window pattern signal to the panel. Apply the color sensor to the panel and monitor the values.
Step 2- Adjust the Sub Bright Setting to 10 cd/m^2.
Step 3- Set the G Cutoff Setting Value to 80.
Step 4- Adjust the Red and Blue Cutoff settings to match the values in Table 1.
Step 5- Readjust the Sub Bright setting to 10 cd/m^2.



80 IRE Window pattern

Step 6- Apply an 80 IRE window pattern signal to the Panel.
Step 7- Set the G Drive Setting value to D8.
Step 8- Adjust the Red and Blue Drive settings to match the values in Table 1.
Step 9- Reapply the 20 IRE pattern and 80 IRE patterns and verify that the drive and cutoff settings match the settings in Table 1, adjust as necessary.
Step 10- Adjust the All Drive Settings value to FC.
Step 11- Reapply the 20 IRE pattern and verify the 15% Light settings match the table below, adjust as necessary.

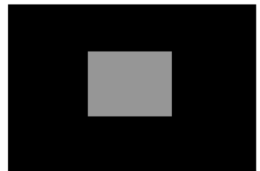
Table 1

Color Temperature	X	Y
Cool (High)	0.272	0.290
Normal (Mid)	0.288	0.296
Warm (Low)	0.313	0.329

Step 12- Press the Picture button on the remote control and change the Color Temperature to Normal, press the Picture button again and re-access the previous settings in IIC mode.
Step 13- Repeat steps 2 to 11 for Normal Color Temperature.
Step 14- Press the Picture button on the remote control and change the Color Temperature to Warm, press the Picture button again and re-access the previous settings in IIC mode.
Step 15- Repeat steps 2 to 11 for Warm Temperature.
Step 16- Change the Color temperature to Cool Mode, then re-adjust the Sub bright value to “30”.

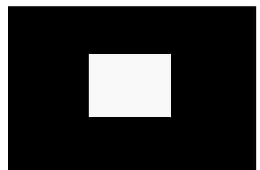
480p White Balance Adjustment

Equipment required: 480p Pattern Generator, Colorimeter
Panel Settings; Picture = Standard, Color Temperature = Cool, Aspect Ratio = 16:9



20 IRE Window pattern

Step 1- Using the Pattern generator; apply a 20 IRE (15% Light) Window pattern signal to the panel. Apply the color sensor to the panel and monitor the values.
Step 2- Adjust the Sub Bright Setting to 10 cd/m^2.
Step 3- Set the G Cutoff Setting Value to 80.
Step 4- Adjust the Red and Blue Cutoff settings to match the values in Table 1.
Step 5- Readjust the Sub Bright setting to 10 cd/m^2.



80 IRE Window pattern

Step 6- Apply an 80 IRE window pattern signal to the Panel.
Step 7- Set the G Drive Setting value to D8.
Step 8- Adjust the Red and Blue Drive settings to match the values in Table 1.
Step 9- Reapply the 20 IRE pattern and 80 IRE patterns and verify that the drive and cutoff settings match the settings in Table 1, adjust as necessary.
Step 10- Adjust the All Drive Settings value to FC.
Step 11- Reapply the 20 IRE pattern and verify the 15% Light settings match the table below, adjust as necessary.

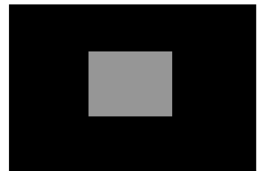
Table 1

Color Temperature	X	Y
Cool (High)	0.272	0.290
Normal (Mid)	0.288	0.296
Warm (Low)	0.313	0.329

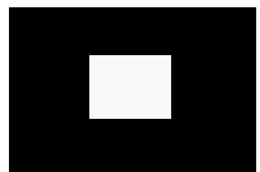
Step 12- Press the Picture button on the remote control and change the Color Temperature to Normal, press the Picture button again and re-access the previous settings in IIC mode.
Step 13- Repeat steps 2 to 11 for Normal Color Temperature.
Step 14- Press the Picture button on the remote control and change the Color Temperature to Warm, press the Picture button again and re-access the previous settings in IIC mode.
Step 15- Repeat steps 2 to 11 for Warm Temperature.
Step 16- Change the Color temperature to Cool Mode, then re-adjust the Sub bright value to “30”.

720p White Balance Adjustment

Equipment required: 720p Pattern Generator, Colorimeter
Panel Settings; Picture = Standard, Color Temperature = Cool, Aspect Ratio = 16:9



20 IRE Window pattern



80 IRE Window pattern

Step 1- Using the Pattern generator; apply a 20 IRE (15% Light) Window pattern signal to the panel. Apply the color sensor to the panel and monitor the values.
Step 2- Adjust the Sub Bright Setting to 10 cd/m^2.
Step 3- Set the G Cutoff Setting Value to 80.
Step 4- Adjust the Red and Blue Cutoff settings to match the values in Table 1.
Step 5- Readjust the Sub Bright setting to 10 cd/m^2.
Step 6- Apply an 80 IRE window pattern signal to the Panel.
Step 7- Set the G Drive Setting value to D8.
Step 8- Adjust the Red and Blue Drive settings to match the values in Table 1.
Step 9- Reapply the 20 IRE pattern and 80 IRE patterns and verify that the drive and cutoff settings match the settings in Table 1, adjust as necessary.
Step 10- Adjust the All Drive Settings value to FC.
Step 11- Reapply the 20 IRE pattern and verify the 15% Light settings match the table below, adjust as necessary.

Table 1

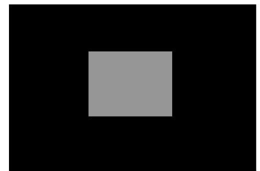
Color Temperature	X	Y
Cool (High)	0.272	0.290
Normal (Mid)	0.288	0.296
Warm (Low)	0.313	0.329

Step 12- Press the Picture button on the remote control and change the Color Temperature to Normal, press the Picture button again and re-access the previous settings in IIC mode.
Step 13- Repeat steps 2 to 11 for Normal Color Temperature.
Step 14- Press the Picture button on the remote control and change the Color Temperature to Warm, press the Picture button again and re-access the previous settings in IIC mode.
Step 15- Repeat steps 2 to 11 for Warm Temperature.
Step 16- Change the Color temperature to Cool Mode, then re-adjust the Sub bright value to “30”.

1080i White Balance Adjustment

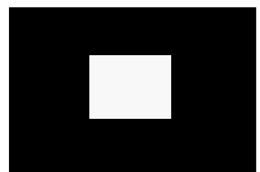
Equipment required: 1080i Pattern Generator, Colorimeter
Panel Settings; Picture = Standard, Color Temperature = Cool, Aspect Ratio = 16:9

Step 1- Using the Pattern generator; apply a 20 IRE (15% Light) Window pattern signal to the panel. Apply the color sensor to the panel and monitor the values.



20 IRE Window pattern

Step 2- Adjust the Sub Bright Setting to 10 cd/m^2.
Step 3- Set the G Cutoff Setting Value to 80.
Step 4- Adjust the Red and Blue Cutoff settings to match the values in Table 1.
Step 5- Readjust the Sub Bright setting to 10 cd/m^2.
Step 6- Apply an 80 IRE window pattern signal to the Panel.



80 IRE Window pattern

Step 7- Set the G Drive Setting value to D8.
Step 8- Adjust the Red and Blue Drive settings to match the values in Table 1.
Step 9- Reapply the 20 IRE pattern and 80 IRE patterns and verify that the drive and cutoff settings match the settings in Table 1, adjust as necessary.
Step 10- Adjust the All Drive Settings value to FC.
Step 11- Reapply the 20 IRE pattern and verify the 15% Light settings match the table below, adjust as necessary.

Table 1

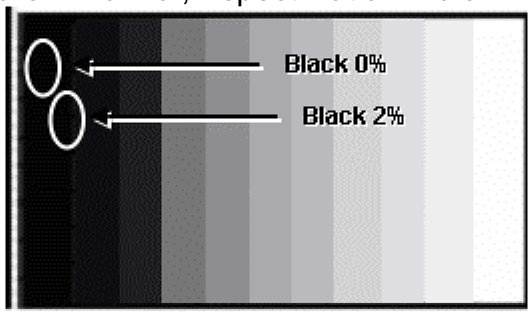
Color Temperature	X	Y
Cool (High)	0.272	0.290
Normal (Mid)	0.288	0.296
Warm (Low)	0.313	0.329

Step 12- Press the Picture button on the remote control and change the Color Temperature to Normal, press the Picture button again and re-access the previous settings in IIC mode.
Step 13- Repeat steps 2 to 11 for Normal Color Temperature.
Step 14- Press the Picture button on the remote control and change the Color Temperature to Warm, press the Picture button again and re-access the previous settings in IIC mode.
Step 15- Repeat steps 2 to 11 for Warm Temperature.
Step 16- Change the Color temperature to Cool Mode, then re-adjust the Sub bright value to “30”.

Sub Brightness Setting

Equipment required: NTSC grayscale pattern Generator
Panel Settings; Picture = Normal, Aspect Ratio = 16:9

Pattern Display:



Note: Adjust in a Dark room.
Step 1- Set the white balance to Cool.
Step 2- Access the All cutoff setting in service mode and adjust so that pixel emission starts in the 2% area and there is no emission in the 0% area.
Step 3- Write down all cut off data.
Step 4- Set the white balance to Normal.
Step 5- Adjust all the cut off values to the same data values of the Cool mode settings.
Step 6- Set the white balance to Warm.
Step 7- Adjust all the cut off values to the same data values of the Cool mode settings.
Step 8- Apply the same pattern to the PC input.
Step 9- Repeat steps 1-8.
Step 10- Apply the grayscale pattern to the RGB input.
Step 11- Repeat steps 1-8.
Step 12- Apply a 525i grayscale pattern to the component input.
Step 13- Repeat steps 1-8.
Step 14- Change to a 525p signal.
Step 15- Repeat steps 1-8.
Step 16- Change to a 625i signal.
Step 17- Repeat steps 1-8.

Service Contact Information

Panasonic Customer Call Center	**1-800-211-7262**
Tech Support Hotline	**PTV and Digital Products** **1-800-743-2335 (Authorized Service Centers only)** **All Other Products** **1-800-572-2672 (Authorized Service Centers only access code required)** **Fax 1-800-348-7315** **1-201-392-4207 Non –authorized (limited time access)**
Other Numbers	**1-800-833-9626 Parts Dept.** **1-800-458-5397 Musical Instruments** **1-201-392-4843 Telephone PBX Systems** **1-800-414-4408 Cellular Phones** **1-877-924-2473 Massage Loungers** **1-201-392-4281 Commercial MWO/Hotel Television**